RAILROAD GAZETTE

FRIDAY, JUNE 9, 1876.

Consolidation Locomotive for the Pennsylvania Railroad.

The following are the specifications, given in the catalogue of the exhibit of the Baldwin Locomotive Works at the Centennial Exhibition, for the freight locomotive, "Consolidation" pattern, constructed by these works for the Pennsylvania Railroad, in accordance with drawings furnished by the company, an engraving of which is given herewith. The engine belongs to "Class I." of this company. Gauge, 4 ft. 9 in.; fuel, bituminous coal.

Cylinders.

Diameter	1 ft.	8	inches.
Stroke of piston	2 ft.		
Length of steam-ports	1 ft.	5⅜	"
Width of steam-ports		1¼	"
Width of exhaust-ports		2⅛	"
Travel of valve		5	"
Outside lap of valves		⅝	"
Inside lap of valve		1-32	"
Exhaust-nozzles—double, square.			

Wheels.

Diameter of driving-wheels	4 ft.	2	inches.
Diameter of truck-wheels	2 ft.	4	"
Distance between centres of front and rear driving-wheels	13 ft.	8	"
Total wheel-base of locomotive	21 ft.	6	"
Total wheel-base of locomotive and tender	47 ft.	7	"
Diameter of driving axle-journals		6½	"
Length of driving axle-journals		7½	"
Diameter of main crank-pin bearing		4½	"
Length of main crank-pin bearing		5	"

Boiler.

Outside diameter of smallest ring of boiler	4 ft.	6⅛	inches.
Thickness of boiler-plates (steel)		⅜	"
Number of tubes	138		
Length of tubes	12 ft.	11	"
Outside diameter of tubes		2⅛	"
Length of fire-box inside	8 ft.		
Width of fire-box inside	2 ft.	10½	"
Depth of fire-box inside (sloping)		42—61	"
Thickness of flue sheet		½	"
Thickness of sides, back and crown-sheet		5-16	"
Square feet of grate surface	23		
Square feet of heating surface in fire-box	92		
Square feet of heating surface in tubes	1,166		
Total square feet of heating surface	1,258		

Weight.

Weight of engine in working order	91,640 pounds.
Weight of engine on driving-wheels	79,400 pounds.

Materials.

Boiler, Bay State Iron Co.'s homogeneous cast steel; *Fire Box*, Singer, Nimick & Co.'s homogeneous cast steel; *Tires*, Standard Steel Works' crucible cast steel; *Truck Wheels*, A. Whitney & Sons' double-plate chilled wheels; *Flues*, Morris, Tasker & Co.'s lap welded charcoal iron boiler-tubes; *Injector*, William Sellers & Co.; *Steam-Gauge*, H. Belfield & Co.; *Headlight*, Pennsylvania Railroad Co.; *Brass and Copper Piping*, American Tube Works; *Jacket Iron*, W. D. Wood & Co.'s patent planished sheet-iron.

Remarks.

The performance of engines of this class on the Pennsylvania Railroad is given in the following table, in comparison with that of the ten-wheeled engines also used for the freight traffic of the line.

Note.

Class I. Cylinders, 20×24; 8 driving-wheels; 50 inches diam.; weight on driving-wheels, 79,400 lbs.

Class E. Cylinders, 18×22; 6 driving-wheels; 50 inches diam.; weight on driving-wheels, 56,000 lbs.

Class D. Cylinders, 18×22; 6 driving-wheels; 55 inches diam.; weight on driving-wheels, 54,000 lbs.

Number of Loaded Cars and Total Weight of Train Hauled by Standard Class I, E, and D Locomotives over given grades on Pennsylvania Railroad, Philadelphia & Erie and Susquehanna divisions, and Average Pounds of Coal per Car per Mile.

Between	Class of Engines	Average pounds of coal per car per mile	West: Maximum grade	West, 15 miles p'r hour: Total weight of train, exclusive of engine. Net tons.	West, 15 miles p'r hour: Number of loaded cars	East: Maximum Grade	East, 15 miles per hour: Total weight of train, exclusive of engine. Net tons.	East, 15 miles per hour: Number of loaded cars
Philadelphia & Columbia*	I.	4.2	49	630	30	40	735	35
" "	E.	4.9	49	420	20	40	504	24
" "	D.	5.2	49	378	18	40	462	22
Columbia & Harrisburgh.†	I.	2.7	17	1,365	65	..	1,470	70
" "	E.	3.2	17	1,071	51	..	1,155	55
" "	D.	3.4	17	945	45	..	1,008	48
Erie & Langdon's	I.	..	..	....	..	71	504	24
" "	D.	..	..	....	..	71	315	15
Renovo & Jersey Shore‡	I.	..	..	....	..	..	1,680	80
" "	D.	..	..	....	..	..	945	45
Susquehanna Division§	I.	..	..	....	..	..	1,785	85
" "	D.	..	..	....	..	..	1,155	55

* I engines haul 40 cars east 10 miles per hour.
† Short grade of 30 ft. east and 37 ft. west.
‡ Grade of 26 ft. for 4 miles, remainder of run about level.
§ I engines very often haul this train at the rate of 25 miles per hour.

from the sheet. He asked, in order to see if any one else had pursued the same line of thought as he had. He thought Mr. Wells' explanation not quite clear enough.

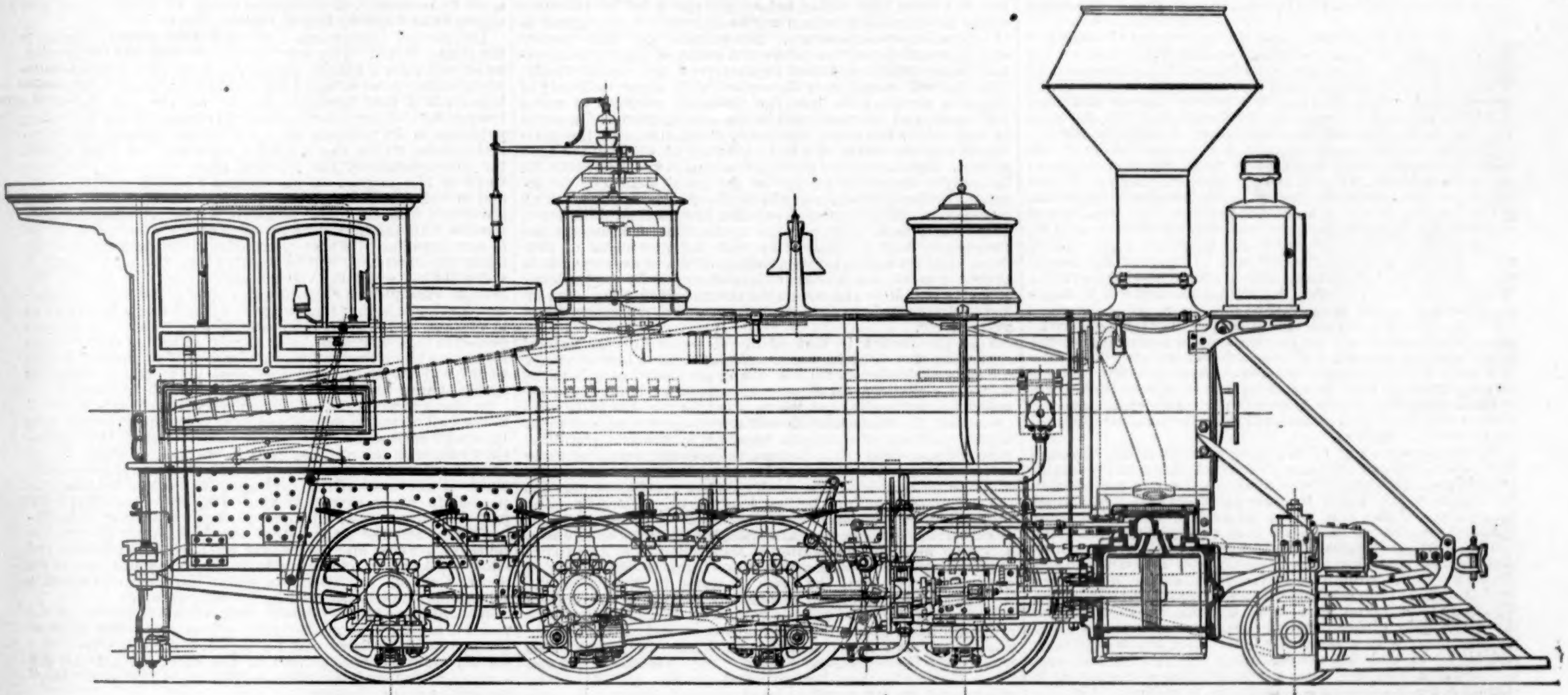
Mr. BARRETT, Grand Trunk, could not supply any theory. The bulging was never in the back sheet; it was in the front sheet, just below the fire-brick arch, and in the side sheets for about 20 inches above the foundation ring.

Mr. WELLS repeated that the opinion of the committee was that the intense heat there drove the water away, and on that account that part of the sheet is more highly heated than if the water were in contact with it. This expansion therefore occurs, the plate is upset, and when it becomes cold there is a tensile strain, which produces the injury.

Mr. ROBINSON, Great Western of Canada, said they ought not to grumble too much. They should be thankful that steel suitable for fire-boxes was made. A much smaller proportion of them failed than of iron boxes. On a road he was lately connected with they had some 100 engines with steel fire-boxes, and they had no more trouble than with copper. The dirtier the water the more trouble they would have; the same with copper. He did not grumble at the quality of the steel they were getting. They would keep on wanting something better. The experience they were now getting was well adapted to overcome the difficulties complained of.

Mr. WOODCOCK, Central of New Jersey, thought they ought to criticize the steel makers, or they would stop trying to better their product. He thought they were getting good results, and would not want to go back to iron. Still, he thought criticism was best.

Mr. HUDSON, Rogers Locomotive Works, believed the makers were doing the best they could, but still it was a fact that they had no certain knowledge as to the quality. A year before he had said that they must get a better material that would stand these strains. He thought now that a better circulation might do a great deal toward remedying this evil of cracking plates. The question was how to get it. Unless they set up a mechanical circulation he was not prepared to say how. He knew if it was done it would relieve the difficulty. He thought the reason deep fire-boxes were more liable to crack than shallow ones was that the circulation was best in the shallow boxes. The particles of steam have a better opportunity to get to the top. He thought that water-spaces should be increased. They must have 4 in. instead of 3 in., and 5 in. instead of 3½ in., and make them wider at the top. If they could not do that, then they must have some mechanical method for securing circulation. As Mr. Sedgley said, how could steel plates be overheated in contact with water? He had known of boilers where the heat was communicated through the steam, some portions of the boiler were not in contact with water, and the whole upper portion of the boiler became so hot that it would set fire to the wood work. He had known locomotive boilers in that condition. The steam was superheated. It was possible to superheat the steam on the side of the furnace. It was very certain that the heat was very much above the temperature due to steam.



From the Illustrated Catalogue of the International Exhibition 1876.

CONSOLIDATION LOCOMOTIVE, FOR THE PENNSYLVANIA RAILROAD, BUILT BY THE BALDWIN LOCOMOTIVE WORKS.

Exhibited at the United States International Exhibition.

MASTER MECHANICS' ASSOCIATION.

Ninth Annual Convention.

We take up the report of the second day's proceedings at the point where we closed last week, in the midst of the discussion of the report of the Committee on Boilers.

Mr. WELLS, Jeffersonville, Madison & Indianapolis, believed that the contraction of the side sheets was as stated in the report. The heat is so intense at the point near or opposite the fire that the rapid formation of globules of steam along that part of the sheet necessarily drives away a part of the water, and when the water is not in contact with the sheet, its temperature is much greater than at other points. The temperature of the sheet would not injure it, provided all parts were heated alike, but as they are not, this highly heated portion will expand in proportion to its temperature; but as the sheet around it will not permit this expansion, the metal in the heated part must upset, if that is beyond the elastic limit. If elastic enough to give within itself, no injury will result; but if not elastic enough, it will to a certain extent be upset, and when the sheet is of uniform temperature again there will be a tensile strain. This portion of the sheet becomes too short because the elastic limit has been exceeded and the metal upset or thickened. He thought that the difficulty was not in the material but in the work exacted from it. It was first upset, then subjected to tensile strain. From experiments by Fairbairn and others it has been found that steel would not resist so much tensile strain when tried once by compression and then by elongation. The change in direction of the strain appears to have a deleterious effect. By low-grade steel the Committee meant steel sufficiently pliable to work without danger of cracking. They did not say whether open-hearth or crucible steel was best, but the largest number of plates reported with a high mileage were crucible steel, though a number were open-hearth steel.

Mr. SEDGLEY, Lake Shore & Michigan Southern, spoke of the bulging of sheets, and inquired as to the cause. If he found sheets bulged in one place he looked for mud there; if he could not find it he inferred that the water had been driven away

The Convention here took a recess for 15 minutes.

After the recess the PRESIDENT introduced Mr. ROBERT BRIGGS, C. E., Editor of the *Journal of the Franklin Institute*, who, after a few preliminary remarks to the Convention, delivered the following lecture:

ON THE CIRCULATION OF WATER IN STEAM BOILERS, ETC.

The three forms of matter—solid, liquid and gaseous—are incident to some definite quantity of heat which accompanies each form, which is known as the latent heat, and varies in amount for the different substances. For water, which is the substance under consideration at this time, the latent heat added to and absorbed in the change of form from ice at 32° to water at the same temperature is 142° 65 (Perron), and in the change of form from water to steam of 32° is 1,092° (Regnault). But the sensible temperature of a liquid at which it will vaporize is found to vary with the pressure (or tension) of the vapor above it, and the tension of steam at 32° is only 0.085 lbs. per square inch, while the pressure of the atmosphere is 14.7 lbs. per square inch. Ebullition or free boiling of water does not take place until the water is heated up to 212°, at which point the tension of steam is equal to the usual atmospheric pressure of 14.7 lbs. per square inch, and the latent heat of change of form from water at 212° to steam at the same temperature is 966° (Regnault).

The other properties of water, as regards heat, with which we have to do in considering the circulation in a boiler, are its expansion and its rate of conductivity. Water expands on being heated at anomalous rates: about 8 per cent. from 40° to 100°, about 3.9 per cent. from 40° to 200°, about 8.7 per cent. from 40° to 300°, and about 11.5 per cent. from 40° to 350°. The conductivity of water is exceedingly slow (as it is in all liquids when not in motion), so slow that it can be assumed to be ab-

solutely non-conducting in the present inquiry. As a consequence of this non-conductivity of water, it can only be heated by the application of heat below, and by transfer and diffusion of the state of heat by means of the motion of the particles of the fluid mass, and uniformity of temperature is attained in such a mass only by continual circulation.

The usual and accepted method of heating water, therefore, is by placing it in a vessel to the under side of which heat is applied, which heat is transfused to the material of the vessel and imparted to the water.

The film of water in contact with the inner surface of the vessel, at the place where its outer surface is exposed to the fire, becomes heated and expands and mixes with the water immediately near it until a stratum of water becomes lighter than the mass of water above it and tends to float, and its flow being suppressed instantly by heavier water, a circulation is commenced.

After the establishment of a circulation of slow velocity, acceleration goes on until at some rate of movement the friction of the currents of water against the sides of the vessel or against themselves (for eddies, whirlpools and cross-currents will form in a vessel under such circumstances) offers a resistance to greater velocity, exactly equal in amount to the disturbing force of the expanded water in trying to rise.

The slow run of first movement with gradual increase of velocity and circulation, arises from the fact that particles of water are, in common with those of other bodies either solid, liquid or gaseous, subject to the laws of the application of force whereby they do not commence to move until some resistance is overcome, nor do they cease to move until the acquired momentum is confiscated. So long as the heat imparted to the water is below the boiling point, a circulation of hot water can be urged with perfect quietness in properly formed vessels and in tubes, until an equilibrium of temperature of the water in the vessel or tube is established; and where the heat of the water is abstracted in the cause of circulation, a high velocity of current can be attained, and great quantities of heat can be transferred without disturbance of flow.

But as the boiling point approaches another train of conditions is brought to bear, which may be better considered by referring to the accompanying figure. [Here a drawing was exhibited.]

Fig. 1 represents a vessel containing water exposed to the action of a fire upon or under the bottom of a vessel. It is supposed that the depth of water in the vessel is 2.4 feet, when it would follow, as the weight of a cubic foot of water at 212° is very nearly 60 lbs., that the pressure of the column of water at the bottom of the vessel is very nearly one pound per square inch.

The relations of pressures and of temperatures of ebullition in this column of water are: at the surface there will be the pressure of the atmosphere =14.7 lbs., with its corresponding temperature of ebullition =212°; at the depth of 1.2 feet the pressure will be 15.2 lbs., and the temperature of ebullition =213° 65; and at the bottom, at the depth of 2.4 feet, the pressure will be 15.7 lbs. and the temperature of ebullition 215° 3.

The effect of the application of fire to the bottom of this vessel having first been admitted to raise the temperature of the entire mass to 212°, and having expelled most of the air which was absorbed in the water at its nominal temperature before heating, it will next be extended to the formation of steam as the means of dispersing the constant addition of heat, and somewhere in the height of the column a point will be reached where the rate of circulation will permit the return water from the top surface, which will inevitably have the temperature of 212°, to reach the bottom where it will be heated, let us say, to 213° 65 by the fire.

The specific heat of water compared to that of iron is very great (about nine times as great), and a film of water of the same thickness as a sheet of iron with which it may be in contact has a little the greater capacity for heat, but the rapidity of convection of heat in water is far greater than that of the conduction in iron, so this general temperature of the water in contact with the iron is maintained with the smallest excess of temperature of the iron.

The extreme tenuity of the gases of combustion, although they have about twice the specific heat of the iron by weight, reduces the relative quantity of heat by volume in contact with the bottom of the boiler to such an extent that the external temperature of the iron where exposed to the fire may for ordinary practice be taken as that of the water within the boiler. Still, notwithstanding the great rapidity of convection, the first result from the intense heat of a flame is to create numerous exceedingly small vesicles of steam (represented by dots on Fig. 1) in contact with the internal surfaces, which float away from it, and in a short distance are absorbed into the water again, giving out their heat to the water of lower temperature. With active firing these small vesicles will form a turbid cloud, and the closing up of the vesicles and contact of water with the bottom will produce a characteristic singing noise which attends boiling and is particularly noticeable just before the boiling point is reached, when the water at the bottom may be a little above 212°, while that of the mass above may not have attained that temperature. In the case which has been supposed, where the temperature is to be 213°.65, after this cloud of vesicles is absorbed, which will occur within two or three inches of the bottom, the water will become cold again, and rise to the height of 1 2 feet before the pressure upon it will have become sufficiently reduced to allow a bubble of steam to fall.

At this height evaporation should commence; it will, however, not do so, because the heat being disseminated in the water completely, and because water has considerable adhesive force or strength of itself (although the particles move upon or slide over each other with much ease, they offer a positive resistance to being separated, which, by the laws of thermodynamics, is measured by the latent heat absorbed), and the water will hold together even when agitated by currents and eddies, as shown in Fig. 1, until relieved of 1 to 2-10ths of a foot more of column pressure; it then begins to exhibit, first a turbidity of small vesicles of steam intermingled with the water, which ascending with the current and agitated together, will, by joining, form small bubbles of steam. These bubbles will have their internal atmosphere of steam, and their internal surfaces are free to give out steam to this little atmosphere, and these little bubbles, which began to form under about 15 lbs. pressure, will augment in size as the pressure is relieved at the same time that they are growing from the formation of steam from the water surrounding them until this formation of steam will have reduced the temperature of the surrounding water to 212°, when the bubbles and the water enclosing them will have reached the surface.

Thus, while the circulation was produced by the levity of the column (the heated water), it is greatly promoted and accelerated by the pressure of steam in bubbles by the heated mass, and the value of this agency of bubbles can be estimated as follows: A pound of water at 212° is very nearly 28.8 cubic inches or 1-60th of a cubic foot, while a pound of steam at the same temperature is 26.36 cubic feet in volume, or 1,580 times as large as the water from which it was made. The case supposed in Fig. 1 gives 1°.65 of heat as being expended in making steam from what was solid water at the depth of 1.2 feet of 213°.65 temperature. The latent heat of steam at 212° is 966°, and consequently the 1°.65 will make (when applied to a pound of water) 1-580th of a pound of steam, the volume of which will be 26.36-580ths of a cubic foot, or 1,580-580ths = 2.7 times the volume of a pound of water; and the mixed volume of bubbles of steam and water which will come to the surface at the temperature of 212° will be very nearly 3.7 times as great as the volume of water which was solid at 213°.65 lower down in the vessel, and the entire volume of mixed steam and water, above the point of the first formation of steam, will be 2.35 times that of the original water at 213°.65. Perhaps it may be well to exhibit some rate of evaporation in conjunction with the supposed ebullition, and this can be done by comparison with the ordinary rate of firing of a stationary boiler, which is from 10 to 12 lbs. of coal per square foot of grate per hour, and as each pound of imperfectly consumed coal on such a grate yields 9,000 to 10,000 units of heat only, the total efficiency of a square foot of grate becomes 100,000 to 108,000 units of heat per hour, equal to about 30 units per second. If it be assumed that the surface of evaporation be equal to that of the grate, and that either equals one square foot, the volume of steam which will be evolved per second will be 0.8 cubic foot, whence 1-1975th of a pound of water must be converted to steam each second for each square foot of grate, or of surface of evaporation, or, in terms of the volume of water, 0.9 cubic inch of water will be evaporated to steam, and 8-27 of a cubic foot (512 cubic inches) of water will be circulated and part with its heat each second. Thus it is evident that while the motive power to promote circulation is very great, the usual conditions of a boiler, with a restricted area of surface for evaporation, demands intense activity. (An example of higher temperature than 212° will be considered further on.)

While this current of steam and water is ascending, a corresponding quantity of water which has lost its heat must descend, and unless provision is made to separate these currents, the conflict will add to the disturbances occasioned by the formation of bubbles. In a vessel or a boiler of considerable dimensions of width as compared with its depth, the conflict will take care of itself, and the velocity of circulation, induced from the expansion of volumes of the heated and partially evaporated mass, will establish a *regime* or equilibrium of action in the transfer of heat from the fire surface on the one hand and to the formation of steam on the other, and the steam bubbles will appear at that point in the column of water where the equilibrium may require them as agents for acceleration. If the water surface at the top of the vessel be not large enough for the steam to evolve itself in the course of a quiet circulation (a not very unfrequent occurrence) and surface evaporation; or for the bubble below the surface to develop in size without interfering with the return circulation from the top, it will then be found that a secondary circulation under pressure from a column of foam will have been established, and the supply of return water for the bottom will be derived from below the evaporating surface. The heated return water thus supplied will be again heated at the fire surface to a point higher than before, and the point of elevation where bubbles begin to form will be depressed to correspond to the elevation of temperature. The bubbles will then develop and approach the surface laden with steam of higher temperature than would be sufficient to preserve a more quiet circulation, and will escape from the surface with some violence; of course a condensation into the disturbed particles of water will ensue, and the result will be the establishment of a strata of foam on the top of the legitimate circulation, and the passing off with the steam of a large quantity of water in the form of mist. This action can go on increasing in violence (with the intensity or extent of surface of the fire as compared to the volume or depth of water to which the fire is applied, taking into account the means of circulation provided) until the active water comes back to the point of application of heat—the fire surface—at such a temperature that the movement of heat there supplied will generate a bubble of steam at once; when, at this moment, the circulation is interrupted by the tendency of such a bubble to rise within the return current; the next effort of the steam is to eject the mass of water within the vessel convulsively.

This phenomena is that of the Geyser. In this natural exhibition of a defective water circulation in a heated vessel, the sides of the Geyser tube or vessel are heated as well as the bottom—a condition incident to various steam boilers, and the vessel has a funnel-shape, which is not so usual in boiler construction. In the normal state of a Geyser, or a mass of water in the small end of a natural funnel, it is in active ebullition from volcanic heat at the bottom, the constant supply of water being maintained by the dripping of springs in the upper part of the cone quite near the earth's surface; and at or near the time of an eruption the boiling water is in, or close upon, an equilibrium of circulation and ebullition. By throwing sods, or substances of about the same specific gravity with the water, down the hole, the circulation is impeded, and a quantity of steam of greater pressure than what is due to the column of water is formed until the mass of water is lifted from the bottom, and the bubbles of steam thus evolved at the bottom will augment from the water surrounding it, especially as the piston of water above it gains in diameter and diminishes in thickness (as the funnel increases in size) *thus reducing the pressure upon the inclosed steam.* The heat of the bottom and walls of the tube will expand the volume of inclosed steam, and evaporate with great celerity the spray or such small quantities of water as may trickle down, and the two causes will preserve the pressure of the steam beneath the water to the point neccessary for the production of the phenomena, notwithstanding the increase of volume. An eruption of much violence will follow—the whole column of water being expelled with great force, accompanied by the evolvement of steam from the mass of water in the air above. After the ejection the fountain of water will have parted with a large part of its heat; and if the time of exposure to the air were long enough, the temperature of the ball and spray would fall below 212°, while the Geyser tube would have been entirely relieved from pressure by the expansion and escape of the inclosed steam, so that the mass could fall back into the heated shower. But not only will scarcely time enough have passed for the water to have divested itself of heat, but the mass which falls will be a broken shower of intermingled steam, air and water; and also the internal surfaces of the tube will have attained, from the absence of water in contact with them, a very high heat, which will be given out to the first small quantities of water which return, generating a large volume of steam, without loss of heat in heating water; and several successive discharges will occur before such degree of quietness is reached as will allow the water to remain within the funnel; and soon after this much turbulence will be exhibited before the regime of circulation will produce a stable condition of movement. In my examples the phenomena of ebullition have been shown at the atmospheric pressure, and although it is not intended at this time to carry this discussion beyond the mere elementary exhibitions, yet it may be well to make a similar sketch and computation at higher temperatures. Fig. 5 represents a vessel containing water exposed to the action of heat similar to those shown in Figs. 2 and 3 (ante) except that a permanant pressure of 120 pounds per square inch above the atmosphere is maintained, under which the generation of steam is supposed to be going on. In consequence of the expansion of water at higher temperature, the height of column which represents one pound pressure now becomes 2.54 feet (in place of 2.4 feet), and in consequence of the properties of steam the difference of temperature corresponding to one-half a pound pressure per square inch becomes 0°.3 (in place of 1°.65). The other figures change as follows: The latent heat becomes at 349°.7,870° (in place of at 212° .966°). A pound of water has a volume of 30.9 cubic inches (in place of 28.8); a pound of steam has a volume of 3.3 cubic feet (in place of 26.36). The volume of steam as compared to the water from which it is formed at 349°.7 is as 185 to 1 (in place of at 212° as 1,580 to 1). The mixed volume of steam and water at the surface will be but 1.06 times that of the solid water at 1.27 feet below, while the total column of mixed steam and water above the solid water is 1.27 feet below, while the total column of mixed steam and water above the solid water is 1.03 times that of the solid water in this case (in place of 2.35 times at atmospheric pressure). It will be seen from this that the tendency to foam falls off rapidly as the pressure at which evaporation is permitted increases, when the bubbles cease to be so large an obstacle to the return circulation; and also that the motive power for circulation gained by the levity of the steam bubbles falls off with increase of pressure. The manifest effect of this deficiency in inducing circulation will be to move the point at which the bubbles will begin to form nearer to the fire surface (lower down in the vessel), and to *define the dimensions* of the streams of rising and returning currents. If the rising current is small enough, the bubble of steam may begin to form on the very bottom of the vessel, rise up enlarging in magnitude to the surface, enveloped all the while in a column of water of (in this supposed case) 350°.3 temperature at the bottom, enlarging by relief of pressure, which acts in two ways; first, by permitting expansion, and second, by causing evaporation into its (the bubble's) atmosphere, and finally is evolved at the top quietly at 349°.7.

There are two other phenomena of boiling which should be stated here. The first of these is to a great degree experimental. If water is carefully heated in a nicely-formed vessel (first taking the precaution to boil it, so as to expel the air which all water absorbs into its volume in quantities relative to the temperature (diminishing with thoir increase), applying the test so as to preclude any disturbance in the course of circulation, the temperature can be elevated much beyond the boiling point without the commencement of ebullition. Mr. Knight, the Secretary of the Franklin Institute, has succeeded in reaching a temperature of 247° in an open vessel, which indicates an internal tension for the water of about 14 lbs. per square inch. Of course the commencement of evaporation under these circumstances is a convulsive ebullition. The presence of a little broken glass or of particles of any material of splintering form, will prevent the phenomena; and the introduction of any sharp object will almost certainly incite ebullition whenever the boiling point is exceeded.

This peculiar property of heated water seems to be the equilibrium of cohesion (before referred to), which is here manifested to an extremity of instability. The conditions by which it can be displayed are so limited that they cannot be regarded as having a possible existence in any steam boiler, and in them there is not the least probability of elevation of the temperature of the water above the boiling point (at any given pressure) by securing that quiescence which all experiments have shown to be demanded for the production of this result.

The second phenomena bears a more important relation to the steam boiler. The way has already been shown in which water will leave a heated surface, so soon as the temperature of the entire mass of water has reached that degree, where the increment of heat imparted by the surface will elevate the temperature of the water brought in contact above the boiling point due to the pressure upon the heated surface, and it remains to be stated how a similar repulsion can exist without the temperature of the repelled mass of water being elevated in like degree. If we suppose a heated surface so hot and so well supplied with heat that its *radiant heat* will generate steam, from the under surface of a mass of water, of greater tension than the subsisting pressure of the atmosphere or inclosure together with that proceeding from the weight of the mass, the mass itself will be repelled from the heated surface, and will float upon the vapor emitted from the water. The familiar example is a drop of water upon a flat iron; the philosophical one is that represented by Fig. 7 and is known as an exhibition of the spheroidal condition of water. Water supported in this way must be evidently in very unstable equilibrium, and with the slightest inclination of the heated surface would roll on its vapor to the lowest point, and a capsule or saucer-shaped vessel is therefore indispensable to retain it.

In the course of the experiment very little heat is imparted to the ball of water, the radiant heat being spent mainly upon the under surface, as that which passes through this surface shows through the water as light shows through glass, whence only the film so to speak of the under surface is heated, and much if not most of this heat upon the surface is at once expended in generation of steam. The little heat that is imparted to the water at the under surface, in place of establishing a circulation of water within the ball, simply disturbs the centre of gravity, and induces the whole mass to roll over and allow its heavier (colder) side to find its equilibrium at the bottom; and in the operation under the conditions stated, a spheroidal shape is assumed by the body of water.

Investigations have shown that when the surface of the vessel is heated to about 380° full a spheroid of water of about two inches of thickness will be repelled and constantly supported, while the temperature of the water (with the air in a summer-hygromatric condition) will be about 206°, or 60° below the boiling point (Boutigny).

This recital of what constitutes the spheroidal condition (so called) of water has been made with so much explicitness in order to render it apparent that it is merely a simple consequence to the laws of transmission of heat from a surface to water, and not an occult property in any sense. The statement of importance in boiler construction is, that at some temperature a heated surface will repel water, and that once repelled the surface will cease to impart such heat as before, and the repelled mass of water can become of much lower temperature than it must have had if the contact had been preserved, and these truths apply to water under pressure (atmospheric or other), and to any height of column of water upon or above the heated surface, the relative temperature being accepted for the various conditions.

Wherever the water has been once repelled from a fire surface or plate, the temperature of that surface will increase with great rapidity and the limit of this temperature of a plate it is difficult to fix. It is certain that when there are gaseous bodies on either side of a plate, the temperature of which bodies are known, the temperature of the plate itself will be a function of the capacity for heat of the two gaseous bodies in opposite contact; but even this complex law for obtaining the heat of a plate from which water has been repelled fails in the case of the fire-box of a boiler, where half the heat from the flame is radiant heat which is absorbed into the plates of the fire-box at an unknown temperature of intensity, although the quantity of heat may be well established. But I think it safe to assert that in less than one minute's time the temperature of a 5-16 inch plate in a fire-box from which water has been repelled will become over 1,000° Fah. and will be materially reduced in strength to withstand the internal pressure."

Mr. Briggs quoted an instance of the failure of some tubes in a class of locomotives constructed ten or twelve years since, for the Illinois Central Railroad. In this case, a cluster of seven 2-inch tubes, which were located about one foot down, upon the tube sheet, in its middle, in several engines of the same class, collapsed about one to two feet in front of the sheet. A sample of one of the collapsed tubes, which was furnished the speaker by Mr. Hayes of the Illinois Central Railroad at the time, showed a cup-shape introversion without rupture of about six inches in length, the upper side of the tube having been depressed into the lower one completely. Of course the tube had been above red heat when this occurred. The remedy was understood to have been the removal of one or two vertical rows of tubes to allow the water to circulate.

I have not attempted to complete this application of principles to the locomotive; in fact, I feel the deficiency of my elementary remarks in their want of comprehensive statement of circulation, where the return takes places from the back

instead of downwards, as I have discussed; but I present their consideration as showing the direction of investigation to be followed in the attempt to account for failures of fire-box sheets or of tubes, whenever the evidence of over-heating presents itself. In these cases, I have little question that obstructed circulation and inadequate water-space have more to do with accidents than the quality or nature of the material of the plates.

After the close of Mr. Briggs' address,

Mr. WELLS said that the committee had made some experiments with a sheet-iron box with glass ends, as described in the report, using charcoal for fuel. They found as soon as the water began to warm perceptibly there were very minute globules of steam formed opposite the fire, which traveled slowly upwards, extending, perhaps, 1-6 inch from the sheet until they disappeared near the top. As the temperature increased these globules became larger and extended further out from the sheet. At this time the thermometer when placed opposite the top of the grate showed only 60°, but near the top of the water it rose to 180°. After the water began to boil the temperature increased at once to about the same at the bottom as at the top, but the thermometer when put down close to the bottom showed one or two degrees less than the boiling point. As the water boiled more rapidly the globules extended out further into the water-space, making curves, and the water seemed to be filled with steam in the shape of foam for two inches down. The water would rise higher on the side next the sheet, turn over and run down. Pieces of wood left the top, came down to that point and were then carried up by currents of steam and water. The globules of steam seemed to travel faster than the water did. The greater the heat the larger the steam globules seemed to be, but the larges ones were formed above the fire, those from below being smaller. When looking in the corners of the box they found a current running down the corners and up in the middle. When not boiling too violently, there was a current down the outside sheet.

Mr. BRIGGS said that that agreed with his explanation, except that the fire was on the other side. The heat was felt all the way up; the elementary effect of the fire applies to the bottom of the boiler. The formation of steam took place at the same point where the pressure was relative to the elevation. The relief pressure was equivalent to the temperature for 213°. When it reached 213° there was violent ebullition.

Mr. WELLS said the conditions were different, the heat being in one case applied at the side, in the other at the bottom.

The PRESIDENT here stated that the hour of 11 o'clock had arrived, which had been appointed for the discussion of the report of the Committee on Locomotive Construction.

A vote of thanks to Mr. Briggs for his address was passed. The report was then taken up.

Mr. SEDGLEY, Lake Shore & Michigan Southern, said that the material for the report was very meagre, the committee having received but twelve answers to the circulars sent out.

Mr. SETCHEL, Little Miami, said that the committee had been continued over from last year; the report then made was principally on the Roberts double-exhaust engine. There was much discussion about this engine and Mr. Brooks and others had promised to make a further statement this year. The report, however, had nothing about it.

Mr. SEDGLEY said the committee had discussed that matter. The engine referred to was the first one built and experience had pointed out some changes which should be made. It has a boiler suitable for a 15 by 22 inch cylinder. The engine had 16 by 20 inch cylinder and 4½ feet driving wheels. The engine has been at work on the Lake Shore road during the year, mainly on passenger trains, a part of the time on a train that has been making perhaps 40 miles an hour, an excessive speed for so small a wheel. They had had no trouble in making 40 or 50 miles an hour with five cars. The engine ran with perfect ease, but if they put eight or ten cars on and tried to make that speed the boiler was not sufficient. So far as the cylinder was concerned, he had no doubt that, with heating surface enough and a wheel adapted to the service done, it would produce better results than the ordinary cylinder. For the service which the engine had been doing there were some things requiring change. He had a statement of the performance of the engine, the cost for fuel and repairs and the cost per car hauled, which he had unfortunately left behind. He would furnish that statement to be embodied in the report.

Mr. HUDSON, Rogers Locomotive Works, said that although a member of the committee he had not been able to take part in preparing the report. If the report was to be underatood as recommending engines of the consolidation pattern in preference to those with fewer drivers he desired to dissent from it. He thought that was a question to the officers of the various roads, to determine what class of locomotives was suitable to their business.

Mr. ROBINSON, Great Western, would ask whether the committee meant to recommend the consolidation engine for all freight service, or for a special service only.

Mr. FRY, Philadelphia & Erie, said that in last year's report the consolidation engine was recommended for exceptionally heavy work, as pusher over mountain grades, for instance. In this year's report attention was called to the fact that one of the largest roads in the country had adopted this class of engine for all its freight service, on level divisions as well as on heavy grades. Complaints have been made that no advance was made in locomotive engineering, that they were doing nothing to promote economy in transportation. An attempt is being made to secure economy by increasing the power used. The committee had not recommended the consolidation engine, they had only given a number of facts affecting the cost of transportation. They desired to call attention to the working of these engines and bring out comparisons of results. During his connection with railroads he had noticed a marked change of opinion as to what kind of a train could be handled in freight service. They used to consider 17 or 18 cars a heavy train; on level divisions 25 cars was a very heavy train. When he went on the Erie they hauled 40 cars in a train and they said there was no use using mogul, as everybody knew they could not handle more than 40 cars in a train. When the consolidation engines were first put on the Pennsylvania on a level division as an experiment, orders were given not to haul over 60 cars, but 60 were taken so successfully that in some cases, more cars being ready to go out, they put on 65, then 70, 75, 80 and finally 100 cars, and now they take no less than 90 cars, with 14 tons on each car. Now if the Transportation Department can handle 80 cars on one train, the Locomotive Department should furnish an engine to haul them. As to the destruction of the track by these heavy engines, as to the cost of repairs, fuel, etc., they had very little information. The committee thought it well to call attention to the performance of this engine, but did not desire to recommend it finally.

Mr. SEDGLEY said the committee wished neither to recommend the consolidation engine, nor to withhold the information they had concerning it. He asked what was the nature of Mr. Hudson's objection to the report.

As regarded the Roberts engine, he understood that Mr. Brooks had something to say and hoped he would be there before the meeting closed.

Mr. HUDSON said that he did not find fault with the report, but desired to dissent from any recommendations of it if such were made. He thought the type of engine suitable for each road ought to be determined. If he were building an engine for a certain duty and one pair of drivers would do the work he would not put more under it; if two pairs would do the work, then two. If he had to put more than three pairs in to distribute the weight he would use three pairs and no more, if that would be enough to do the work. He thought there was a limit somewhere, which must be determined by the requirements of the service.

Mr. SEDGLEY asked for the reading of that portion of the report relating to the consolidation engine.

The PRESIDENT stated that Mr. Dripps, formerly of the Pennsylvania Railroad, had handed him some figures based on experiments made by him with eight-wheel, ten-wheel and consolidation engines. Mr. Wells now had the paper.

Mr. WELLS said that diagram which he exhibited represented an ordinary eight-wheel engine as used on the Pennsylvania. In this first class out of three in the table, the engine had 16 by 24 in. cylinders, drivers 60 in., weight on each pair of drivers 24,000 pounds, total 48,000 pounds; weight on truck 20,500 pounds; weight of tender and load, 32,600 pounds; friction on engine going round a curve at 10 miles an hour, 19,600 pounds. The degree of curve was not stated.

The PRESIDENT said that the experiments were all on the same curve. The next diagram was a freight engine, No. 1,119; cylinders 18 by 22 in., drivers 55 in., three pairs of drivers and an ordinary (four-wheel) truck; weight on drivers, 52,800 pounds, on truck, 22,600 pounds; weight of tender, 47,700 pounds; friction going around the curve at 10 miles an hour, 17,500 pounds, being less than with the eight-wheel engine.

The third diagram was the consolidation engine, cylinders 20 by 24 in.; drivers, 49 in.; total weight on four pairs of drivers, 78,500 pounds; on a single pair of wheels, 19,700 pounds, friction going around the curve at 10 miles an hour, 18,500 pounds. This was 1,100 pounds less than the eight-wheel engine and 1,000 pounds more than the other. He thought that these experiments might be published with the report.

Mr. SPRAGUE, Pittsburgh, suggested that in that case the length of wheel-base of the different engines and the degree of curve be also ascertained and added to the tables.

Mr. WELLS accepted this suggestion, and it was agreed that the record of the experiments be published with the report.

Mr. HUDSON asked how the resistances were determined.

The PRESIDENT said Mr. Dripps had told him that he had a very sensitive dynamometer. He had been a long time getting these results, beginning over two years ago. During Mr. J. Edgar Thomson's life he did not feel at liberty to publish these results, but the engine had now been adopted by the road. He was making more experiments, the results of which he would be glad to furnish to the Association.

Mr. HUDSON asked how the dynamometer was used, as that had an important bearing on the result.

The PRESIDENT said he would have to ask Mr. Dripps, who was not present.

Mr. STRATTON, Pennsylvania, said that they used a dynamometer car fitted with a suitable apparatus, carrying paper through rollers. It was connected with the axle of a pair of wheels, so that the paper traveled at a rate exactly in proportion to the speed of the car. The dynamometer was connected with the bull-nose of the engine and the spring used was tested with standard weights. The resistance put upon the spring was shown in pounds. This dynamometer was self-recording and automatic in its action. The car was placed between the engine hauled and another one, so that the resistance was recorded on a dial which connected sensitively either when the car was being pulled or pushed against the engine. The spring was tested by test weights, and he believed, from experiments made since, that the records taken from that car were absolutely correct, that is, within a very few pounds. The recording apparatus would work as well when pushing as when pulling. If the car was used between an engine and train it would record the resistance when one or any number of brakes were put on. Mr. Dripps was now working up some further experiments, but they were not quite in complete shape for publication yet.

Mr. HUDSON thought that was not quite light enough on the subject. He believed that when an engine was pushed or pulled around a curve the resistance would not be quite the same as when it was furnishing its own motive power. He would take exception to any pushing or pulling as indicating resistance, unless the car furnished its own motive power.

Mr. WELLS thought these experiments were only of value as a comparison between different styles of engines under the same conditions, on the same curve. They would not give the precise resistance to an engine moving around the curve by its own power.

Mr. EDDY, Boston & Albany, asked whether the connecting rods were all on when the experiments were made. He did not know but that an engine with three or four pairs of drivers would run up hill easier than an ordinary one, but he did not believe it would.

Mr. GARRETT, Pennsylvania, said that the main rods were taken off all the engines while making the experiments.

Mr. EDDY did not believe that it was a very good experiment to put on record then. The engines were not in working condition. If the rods were in and nicely adjusted they would have very little effect in helping the engine on or holding it back. He would not vote to have the results go upon their record. It would take some time to convince most of them that an engine with six or eight wheels connected would run as easily in service as one with four wheels connected.

Mr. ROBINSON asked what speed these consolidation engines were run at and whether there was any trouble with them in the general way of work.

Mr. FRY said that there were but few of them as yet, and they had to work the regular trains on the schedule, running at regular rates of speed. It was quite common to see them running express freight trains. No trouble was found with them hauling on a level. They did not pull the draw-bars out particularly there.

Mr. EDDY asked if, in accepting the report from the committee, that placed it on file.

The PRESIDENT said it was simply embodied in the minutes, and became part of the proceedings.

Mr. EDDY moved and Mr. HUDSON seconded a reconsideration of the vote by which it was accepted.

Mr. EDDY did not believe that they should impart such information as that. It was not a correct thing to go by. It was merely taking a car or carriage and hauling it along the road to see if it would go easier than another car. He had had engines similar to these, and he believed that there was a great deal of friction there. They took a great deal of power to propel themselves, and they ran much harder, with more wear and tear of the track.

Mr. JOHANN, Toledo, Wabash & Western, did not agree with Mr. Eddy as to the reconsideration. He thought it was valuable matter for information. They met to exchange views and ideas, and he thought that all information offered should go upon record. It was not an expression of opinion; it was merely a record of certain facts.

Mr. SEDGLEY asked that the document be read. The committee had not endorsed it as part of the report, but he thought that no facts should be withheld.

Mr. PHILBRICK, Leavenworth, Lawrence & Galveston, said that he had talked with Mr. Dripps and had received many new ideas from him. He had spent much time and labor in these experiments. With all due respect for Mr. Eddy, to whom he had looked up for 25 years, he thought this matter should go upon record.

Mr. ROBINSON said that when they received a report they did not necessarily endorse the views expressed therein.

Mr. EDDY said that it went upon the printed record.

The SECRETARY then read the portion of the report referred to.

Mr. EDDY said he would like to know the sizes of the engines. It took 16 six-wheel connected engines to do the work of 11 consolidation engines, and he would like to know the relative sizes.

Mr. FRY said that the ten-wheel engine was a standard engine formerly of the Pennsylvania road. It had 18 by 24 in. cylinders, driving wheel 55 in. diameter. The consolidation engine has 20 by 24 in. cylinders, with 49 in. drivers.

The PRESIDENT said that on a pair of drivers on the eight-wheel engine the weight was 24,000 pounds; on the mogul, 17,600 pounds, and on the consolidation, 19,625 pounds.

Mr. FORNEY, *Railroad Gazette*, thought that the most important point had not been brought forward. Mr. Fry had said that they hauled trains of 90 cars. Now was it more economical to handle trains of 90 cars with the consolidation, of 70 with the mogul or of 40 with the ordinary engine? In considering economy they must not look at consumption of fuel alone: there were many other expenses. The wages of enginemen and firemen distributed over 90 cars made very much less per car than with 40 cars. The same is true of conductors and brakemen, so that the total train expenses must be less with the heavier train.

Mr. ROBINSON thought the subject was analogous to the question of broad or narrow gauge. They had gone to the opposite extreme from where they were two years ago. With a four-track road, two tracks used exclusively for freight, the more cars you could put in a train the better. He would then pull 100 cars and stop only for water. On two tracks the wear and tear would be too great, and a six-driver engine would be better. The traffic must determine the style of engine.

Mr. EDDY asked if the boiler capacity of the two engines was as 16 to 11, or whether the extra pair of drivers helped the boiler to make more steam.

Mr. HUDSON said there was another question. It would take more power to pull 100 cars than to pull 50; the forward cars of the 100 must be strong enough to stand the pull upon them. He had heard of the ends being pulled out of cars. The question how many cars could be hauled in a train safely depended somewhat on how strong cars could be made. The repairs to the cars in long trains might be greater than in shorter ones.

Mr. ROBINSON said that a clear track and few stops obviated that objection. It was not the steady pull, but the stopping and starting that damaged cars.

Mr. FRY said that steam enough was provided by the boilers without reference to the number of axles. They had found, as Mr. Robinson said, that it was the stopping and starting, the jerking, that broke draw-bars. This was found in going over heavy grades, as well as on level track. An incidental advantage with the heavy engines on level track is that the load is not so severe with 90 cars, and they start with more ease than a smaller engine with a lighter train. No difficulties had been found, even upon a one-horse road, where they had been trying the engines. They had four trains to be hauled there and had fewer crossings and could make better time. The whole thing was new yet, and there were many points still to be decided.

Mr. FORNEY said of course no one present would say that an extra pair of wheels would make more steam. Generally the persons in charge of a road limited the weight of engines to the wheels. If the maximum weight allowed was 24,000 pounds to a pair of wheels, and you wanted a boiler of large size that would weigh more, you must put an extra pair of wheels under it. He was not prepared to say whether 90 cars in a train was more economical than half that number, but he thought that they should look carefully into this question of large or small trains. There were more roads than business and every manager was studying economy. Those who did business the most economically would survive now when roads were being undermined by low rates.

Mr. EDDY said that he had got no reply to his question as to boiler capacity.

Mr. FRY said that the sketch submitted showed the dimensions. The fact that the engines had been hauling the trains for months showed that they had the capacity.

Mr. FORNEY said those that had been built had heating surface in proportion to an ordinary engine about as 14 or 15 to 9 or 10.

Mr. COOLIDGE, Fitchburg Railroad, said that one point at issue had not been touched. To make available in friction or adhesion the weight of the engine required more drivers. He had had some experience with mogul engines. The ordinary eight-wheel engine weighed about 30 tons, 18 tons on the drivers, and 10 or 12 tons on the truck. He was not familiar with the consolidation, but the mogul engine weighed 35 tons, 5 tons on the single truck and 30 on the drivers. Here was one-half more weight available for adhesion with only five tons difference in gross weight. He had had two moguls, one in service between three and four years. It had 17 by 24 in. cylinders, 60 in. drivers, and single truck. It weighed 35 tons. The average load for a 16 by 24 in. cylinder ordinary engine was 22 cars fully loaded, or 25 cars as they were usually loaded. The mogul took from five to seven more with the same amount of fuel as the other. As to friction and wear of track, he could see no difference. The question was whether the gain by increased adhesion was neutralized by the disadvantage of having more wheels and connecting rods. Any man could decide that for himself. He had another 36-ton mogul, 30 tons on the drivers, which would draw seven cars more than the other engines.

On motion of Mr. CLARK, the debate was then closed.

The PRESIDENT then announced that further discussion on the report of the Committee on Boilers was in order.

On motion of Mr. ROBINSON, the discussion on that report was finally closed.

Contributions.

A New Process for Refining Iron.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The article taken from the Detroit *Post*, giving a brief description of processes used at the Wyandotte rolling mills, was incomplete in not stating more fully the nature of the invention alluded to. Mr. A. T. Hay, of Burlington, Iowa, has for many years been working a new process, by which he takes the most worthless and refractory cold or red-short irons, either in the ore or pig, and transmutes them into a quality of wrought iron equal to the very best Norway, at a cost scarcely worth consideration. At Wyandotte he worked cold-short Wisconsin iron into bars which withstood a tensile strain of 80,000 lbs. to the square inch, in a regular testing machine. This iron welds with the greatest facility to either iron or steel, and the process described, to which your correspondent, Mr. Mills, of Kingston, Pa., takes exception, was simply an incidental one, to test the closeness of the weld when made in a rolling mill, and also the capacity of the iron to withstand crushing blows.

In this last experiment, the Hay iron railroad rail was welded to a steel band ⅜ of an inch thick round the head, the balance of the rail being iron. It was placed under a steam hammer and pounded till it broke down, the number of blows being counted. A similar piece of Bessemer steel was then placed under the same hammer, when it doubled up like the letter U with one-third fewer blows than the iron rail.

It is probably well known to your readers that thousands of tons of Missouri and Lake Superior ores are taken to Ohio and Pennsylvania in barges at great expense, to temper the ores of that region with a mixture of cold and red-short ores forming a very good neutral product. The Hay process will, it is asserted, save all this cost, as a far superior quality of metal can be made without using any tempering ores at all.

As tested by endurance, torsional, twisting and bending, for toughness and strength, the Hay iron, made from Wisconsin ores, which made a product, by the ordinary process almost useless for any purpose except for the top flake of rail heads, proved to be fully equal to, if not even better, than the very best B Norway iron, worth 11 to 12 cents, when common iron sells at 3 cents.

If this gentleman can effect this most important object, and what is doubtless still more difficult—persuade the iron masters of the regions which produce these inferior ores to adopt his process, a tremendous stride will have been made towards giving us what we now lack very much—a very superior quality of wrought iron at a fair price. By this process it is claimed that most, if not all of the sulphur, phosphorus and other obnoxious compounds which now spoil the metal, are taken out, leaving the iron in all its native purity and strength. No expensive "plant" is needed.

If Mr. Mills really has "a patent for welding, in any manner, steel to steel, and iron to iron," as he says he has, and can enforce his rights, he has a tolerably good thing, hasn't he?

T.

[The Iowa process mentioned above is apparently quite revolutionary, and yet our steel and iron-making friends tell us that after their long and costly toil in connection with the processes which they have established they cannot see their way clear into any radically new methods.

It is sometimes urged that inventors get but scanty hearings before the steel-makers for the claims of their new methods of working, but one reason is that, as a rule, each of our manufacturers has sunk about as much money as he can afford in the costly task of building up his own business. He therefore naturally declines in few words the invitation to spend more money for the benefit chiefly of somebody else.

We think that one need hardly be a steel-maker by trade before he would be inclined to question the exact truth of the statements of our correspondent, as to the cost of making this wonderful iron which is declared to be "scarcely worth consideration." We must assure our correspondent "T." that this is a delusion, and that he will find a fatally weak spot somewhere in the estimate of cost. If there be really any commendable feature in this Iowa plan, it is rendered ridiculous—to speak plainly—by such sweeping claims for it as a whole.

We cannot now enter into the "sulphur, phosphorus and other obnoxious compounds" question, but must nevertheless say that the most ample experience has conclusively shown that steel cannot be made by any process without an "an expensive plant." We wish we could once for all assure our friends who write so frequently to us in this general strain, that if they expect to compete in steel-making with the colossal establishments now running, and to use in so doing any less capital or plant, then they will find themselves high and dry in a wonderfully short time. This has been the experience of scores of inventors and small capitalists, who have believed they had "a new light" in steel, but the logic of steel-making facts is inexorable, and unfortunately it cannot spare even the most deserving, if he undertakes to run counter to its premises.

We venture two other hints of a somewhat kindred sort to correspondents who sometimes have a flux to recommend for use in welding steel scrap, or the crop ends of steel rails. One is that no one can find or buy in the whole country an amount of such scrap sufficiently large to make it worth his while to erect machinery with which to work it. The other is that if it could be found and bought, then the only way in which it could be worked to a profit is by *remelting* and not by any pasting together of pieces with a flux, however good that may be for detached items of work in the hands of a skillful smith.

This may seem plain talk and not overkind to those who have new plans for which they seek public approval. These may safely content themselves, however, with this reflection, that in this, as in all similar things, the "survival of the fittest" is guaranteed, and that if they hold the winning cards, and can hold them long enough, they will win.—EDITOR RAILROAD GAZETTE.]

General Railroad News.

TRAFFIC AND EARNINGS.

Cotton Movement.

For the crop year from Sept. to June 2, nine months, seaboard receipts and exports have been:

	1876.	1875	Increase.	P. c.
Receipts	4,018,014	3,408,4 5	609,589	17.9
Exports	2,976,792	2,498.827	477.965	19.1

Ocean Freights.

Last Saturday shipments from New York to Liverpool were taken at 5-16d. per lb. for cotton, 23s. 9d. per ton for oil cake by sail; and by steam at 5-16d. per lb. for cotton, 9¾d. to 10d. for corn and wheat, 50s. per ton for cheese and 40s. for bacon. The same day freights were taken at Philadelphia for Liverpool at a little lower rates, viz., ¼d. for cotton and 9d. for corn. By sail from New York grain was taken for Cork and orders at 10d., 10½d., 9¾d.; from Baltimore at 10½d.; from Philadelphia, 9¾d., 9¾d.

Tuesday last rates remained about the same: by steam to Liverpool, 5-16 cent per lb. for cotton, 40s. per ton for bacon, 9½d. to 10d. per bushel for grain; grain by sail to Cork for orders, 10¼d. A charter from Boston by sail to Cork for orders was reported at 9d. per bushel.

Railroad Earnings.

Earnings for various periods are reported as follows:

	1875.	1874.	Inc. or Dec.	P. c.
Year ending Dec. 31:				
Buffalo, Corry & Pitts..	$154,801	$155,887	Dec.. $1,086	0.7
Expenses	172,999	138,277	Inc .. 34,722	25.1
Deficit or net	$18,198	$17,610		
Earnings per mile	3,609	3,625	Dec.. $25	0.7
Per cent. of expenses.	111.76	88.70	Inc .. 23.06	26.0
Ches. & Ohio Canal	473,218	516,411	Dec.. 43,193	8.3
Expenses	219,043	227,204	Dec 8,161	3.6
Net earnings	$254,175	$289,207	Dec.. $35,032	12.5
Flint & Pere Marquette	1,055,054	1,063,986	Dec.. 8,934	0.8
Expenses	696,456	668,995	Inc .. 27,461	4.1
Net earnings	$358,598	$394,991	Dec.. $36,393	9.2
Earnings per mile	3,754	4,566	Dec.. 812	17.8
Per cent. of expenses.	66.01	62.88	Inc .. 3.13	5.0
Year ending March 31:				
Chi., Rock Island & Pa..	$7,665,162	$7,398,635	Inc .. $266,527	3.5
Expenses	3,687,029	3,856,330	Dec.. 169,301	4.4
Net earnings	$3,968,133	$3,532,305	Inc .. $435,828	12.3
Earnings per mile	11,341	10,954	Inc .. 387	3.5
Per cent. of expenses ..	48.16	52.19	Dec.. 4.03	7.7
	1875-76.	1874-75.		
Keokuk & Des Moines..	$741.339	$757,382	Dec.. $16,043	2.1
Expenses	514,501	474,514	Inc .. 39,987	3.4
Net earnings	$226,838	$282,868	Dec.. $56,030	19.8
Earnings per mile	4,605	4,704	Dec.. 99	2.1
Per cent. of expenses.	69.40	62.65	Inc .. 6.75	10.8
Nashua & Lowell	504,260	.....	.....	....
Expenses	395,057	.....	.....	....
Net earnings	$109,203	.....	.....	....
Earnings per mile	9,425	.....	.....	....
Per cent. of expenses.	78.34	.....	.....	....
Five months ending May 31:				
Chicago & Alton	1,794 431	1,730,733	Inc .. 63,698	3.7
	1876.	1875.		
Chicago, Mil. & St. Paul.	$3,083,115	$2,650,273	Inc .. $432,842	16.3
Ohio & Mississippi	1,542,923	1,332,292	Inc .. 210,631	15.8
Pacific, of Missouri	1,448,803	1,173,720	Inc .. 275,083	23.4
St. Louis, Kansas City & Northern	1,273,163	1,058,898	Inc .. 214,265	20.2
Tol., Peoria & Warsaw.	557,278	351,352	Inc .. 205,926	58.6
Four months ending April 30:				
Bur., Cedar Rapids & Minnesota	$367,633	$363,019	Inc .. $24,614	6.8
Chi., Bur. & Quincy	3,536,7o7	3,525,591	Inc .. 11,116	0.3
Expenses	1,910,184	1,941,661	Dec.. 31,477	1.6
Net earnings	$1,626,523	$1,583,930	Inc .. $42,593	2.7
Per cent. of expenses.	54.01	55.04	Dec.. 103	1.9
Louisville, Cin. & Lex..	323,149	.....	.....	....
Month of April:				
Toronto, Grey & Bruce.	$27,543	$33,885	Dec.. $6,342	18.7
Month of May:				
Bur., Cedar Rapids & Minnesota	$88,164	$100,535	Dec.. $12,371	12.3
Chicago & Alton	$442,457	$351,004	Inc .. 91,453	26.1
Chi., Mil. & St. Paul.	$819,853	$718,465	Inc .. $101,388	14.1
Louisville, Cin. & Lex..	80,280	.....	.....	....
Expenses	63,249	.....	.....	....
Net earnings	$17,031	.....	.....	....
Per cent. of expenses.	78.78	.....	.....	....
Ohio & Mississippi	313,070	260,456	Inc .. 52,614	20.2
Pacific, of Missouri	264,847	222,331	Inc .. 42,516	19.1
St. Louis, Kansas City & Northern	237,355	188,083	Inc .. 49,272	26.2
Tol., Peoria & Warsaw.	125,050	70,594	Inc .. 54,458	77.1
Week ending May 19:				
Great West'n, of Canada	£16,048	£16,283	Dec.. £235	1.4
Week ending May 20:				
Grand Trunk	£32,300	£35,100	Inc .. £2,800	8.0
Third week in May:				
Denver & Rio Grande..	$8,523	$8,443	Inc .. $80	0.1

Flour and Grain Movement.

Baltimore grain receipts for May were as follows:

	1876.	1875.	Increase.	P. c.
Flour, barrels	142,046	105,481	36,565	34.7
Wheat, bushels	350,609	258,805	91,804	35.5
Corn, bushels	2,537,740	887,966	1,649,774	185.8
Other grain	119,042	72,820	46,222	63.5
Total, bushels	3,646,598	1,794,256	1,852,342	103.3

For the five months ending May 31 the receipts were:

	1876.	1875.	Inc. or Dec.	P. c.
Flour, barrels	590,135	665,441	Dec.. 75,306	11.3
Grain, bushels	12,960,842	6,290,785	Inc .. 6.660,057	105.9
Total, bushels	15,606,450	9,285,270	Inc .. 6,321,180	68.1

For the same period the increase in receipts at all the Atlantic ports was 30 per cent.

Buffalo grain receipts for May were as follows:

	Flour, bbls.	Grain, bu.	Total, bu.
Lake	66,662	6,511,621	6,824,931
Lake Shore & Mich. Southern	106,500	1,877,600	2,356,850
Total	173,162	8,389,221	9,181,781

The shipments for the month were as follows:

	1876.	1875.	Increase.	P. c.
Rail, bushels	1,852,861	1,451,358	401,503	27.7
Canal, bushels	4,528,620	2,230,102	2,298,518	103.1
Total	6,381,481	3,681,460	2,700,021	73.3

The canal opened May 4 this year, and May 18 in 1875.

Coal Movement.

Coal tonnages for the week ending May 27 are reported as follows:

	1876.	1875.	Inc. or Dec.
Anthracite	379,760	284,437	Inc .. 95,323
Semi-bituminous, Broad Top	3,375	.....	.....
" Clearfield	26.581	17,627	Inc .. 8,954
" Cumberland	46,654	.....	.....
Bituminous, Barclay	4.562	.....	.....
" Allegheny Region	3,870	.....	.....
" Western Pa.	24,847	.....	.....

The Cumberland trade is still in a very unsettled condition.

The coal tonnage of the Belvidere Division, Pennsylvania Railroad for the five months ending June 3 was as follows:

	1876.	1875.	Inc. or Dec.	P. c.
For shipment at Coal Port	76.231	206	Inc .. 76,025	.....
" " South Amboy	185,839	19,701	Inc .. 166,038	838.6
Distribution on New Jersey lines	59,178	73,573	Dec.. 14,395	19.6
Company's use " "	21,912	6,348	Inc .. 15,564	245.1
Totals	343,160	99,928	Inc .. 243,232	243.3

Of the total this year 201,643 tons were from the Lehigh and 141,517 tons from the Wyoming region.

Opening Lake and Canal Rates.

The Buffalo *Commercial Advertiser* says:

"The Centennial year will always be remembered by vessel owners as the one in which freight rates by water reached lower averages than ever before known. After the panic of 1857 transportation charges fell to a very low point; but they did not remain there long. This season it has been a steady drag thus far, and there are no immediate signs of improvement. The following statement of the average freight on wheat and corn from Chicago to Buffalo by lake, during the month of May, and the average on the same cereals to the east by canal, shows a discouraging condition of affairs:

Year.	LAKE. Wheat. cents.	LAKE. Corn. cents.	CANAL. Wheat. cents.	CANAL. Corn. cents.
1867	5.5	4.2	12.3	10.3
1868	5.2	4.0	14 5	11.3
1869	5.8	5.0	13 9	11.6
1870	5.0	4.4	11.5	10.7
1871	4.5	4.1	11.5	10.5
1872	8.0	7.4	12.8	11.3
1873	7.4	6.5	11.8	10.5
1874	4.5	4.0	11.7	10.3
1875	3.9	3.7	7.4	6.6
1876	3.0	2.7	6.7	5.8

"Last year when the average rate on wheat for May was nearly 4 cents a bushel, vessel men thought that bottom had been reached, and that the next change must be for the better. After navigation was fully resumed this year, however, a rate as high as the average for last season has been the exception; while many were made on private terms lower than any used in making up our exhibit. Carriers, like grain dealers, are reluctant about quoting a very low rate. Consequently the published charters in a very dull season do not represent the true condition of the freight market. If the exact price for every shipment made could be ascertained, it is probable that the average would not exceed 2⅝ cents. The lowest reported rate at Chicago was 2⅝ cents, but we understand that a few cargoes were taken for 2½ cents.

"By canal there has been very little fluctuation during the month. The season opened with the rate on wheat at 8 cents, but it declined to 7 cents in a few days. Before the middle of the month had been reached the market was dull at 6¾ and on the 16th 6½ was the prevailing price. But this was not the lowest point. On the 24th large shipments were made at 6⅛, which is the cheapest rate at which wheat was ever transported from Buffalo to New York. The average for this May, it will be seen by the above exhibit, is nearly a cent lower than that for the corresponding month last season. The competition this year is stronger than ever before, but the boatmen seem to be standing up against it quite as successfully as vessel-owners, but the business is being done for almost nothing.

"The railways are in the same situation. Most of the through shipments from Chicago have been made at about 15 cents a hundred, which is 9 cents a bushel,* for moving the property nearly a thousand miles. This price will scarcely pay for the coal consumed by the locomotive, to say nothing about other expenses. From Buffalo to New York the rail charge has ranged from 7 cents to 6½. These are remarkably low rates, although considerably above canal charge.

"The worst feature of this transportation business is that the present ruinous competition was courted: it was not necessary. The railways had been doing a good business all Winter. The movement of grain and provisions to the seaboard was large, and the prices obtained were very remunerative. At the opening of navigation, however, large stocks were still in the interior. Instead of being content with securing a reasonable percentage of this at paying prices the rail rates were reduced to about 25 per cent. of those charged during the winter. This was done for the purpose of diverting the lake business to the rail routes. The reduction was made under color of a railroad war and a general breakdown of prices. But we have learned from a high railroad official at the West that the trunk lines have decided upon this course as the one most likely to destroy the vessel interest, and that ruinously low rates during the season of navigation may be looked for in the future. If this is the case, Congress ought to interfere. The roads should not be allowed to charge enough in the winter to enable them to do business for nothing in the summer."

Railroad Traffic.

Shipments of through freight eastward over the Central Pacific in April were as follows:

	Tons.
San Francisco	2,977
Sacramento, Marysville, San Jose and Stockton	213
Total	3,190

The leading items for the month were 1,845 tons wool and 400 tons wine.

The number of cars received at and forwarded from Indianapolis on the various lines entering that city during the month of May was as follows:

	1876.	1875.	Decrease.	P. c.
Loaded	34,693	37,692	2,999	8.0
Empty	19,106	19,526	420	2.2
Total	53,799	57,218	3,419	6.0

The first week of June shows an increase of movement.

Erie Canal Traffic.

The business of the Erie Canal at Buffalo for May was as follows:

	1876.	1875.	Increase.	P. c.
Tolls received	$90,074	$41,531	$48,543	116.9
Boats cleared	700	306	394	128.8

The canal opened May 4 in 1876, and May 18 in 1875, so the average receipts per day were $3,336 this year and $3,195 last.

RAILROAD LAW.

The Minnesota Railroad Bonds.

In the case of Selah Chamberlain against the Southern Minnesota Company, the St. Paul & Sioux City Company and others, recently decided in the United States Supreme Court, that court held, affirming the decision of the Circuit Court:

1. The act of Congress of March 30, 1857, granting certain lands to the Territory of Minnesota for the purpose of aiding in the construction of several lines of railroad between different points in the territory, only authorized for each road, in advance of its construction, a sale of 120 sections; no further disposition of the land along either road was allowed except as the road was completed in divisions of 20 miles.

2. Where land is conveyed to the State by a corporation as indemnity against losses on her bonds loaned to it, the bondholders have no equity for the application of the land to the payment of the bonds which can be enforced against the State, and her grantees take the property discharged of any claim of the bondholders.

Mr. Chamberlain, who was contractor for a portion of both roads, holds $500,000 of the bonds of the State of Minnesota issued to the original companies. These companies failed and the liens of the State upon their roads were foreclosed, and the

*Railroad men in New York say that this is not true, and that nearly all has been taken at 20 cents. The fact that half the grain has gone by water at rates equal to 9 cents or more per bushel is of itself evidence that the rail rate must have been higher.—EDITOR RAILROAD GAZETTE.

property with the land-grants was transferred by the State to the new corporations which built and now own the roads. Mr. Chamberlain, payments of the bonds being refused by the State, brought the suit lately decided to attach a lien to the land grants. The Court has now finally decided against him, but in its opinion uses the following language as to the liability of the State:

"On the 4th of March, 1864, the Legislature passed an act by which two new companies were organized; one, with the same name as the original company, the Southern Minnesota Railroad Company; and the other, by the name of the Minnesota Valley Railroad Company. The name of this latter company was afterwards changed to that of St. Paul & Sioux City Railroad Company.

"To the companies thus organized the Legislature granted, subject to certain conditions, all the property, rights and franchises of the original company, which the State had acquired, 'free from all claims and liens.' * * The conditions annexed to the grants were complied with and the grants accepted. These new companies soon afterwards commenced the construction of their respective roads, and had, at the commencement of this suit, nearly completed them. * *

"Upon the completion of ten miles of its road each company received from the Governor, pursuant to the provisions of the act, a deed in fee simple of 120 sections of land appertaining to its road, to which the State was entitled under the Congressional grant, and the bonds of the original Minnesota company were transferred to the Treasurer of the State and canceled.

"Pending these proceedings the bonds of the State in the hands of the complainant remained unpaid, and they are still unpaid. The faith of the State, solemnly pledged for the payment of both principal and interest, has never been kept. So far from keeping it, the State, as early as November, 1860, adopted an amendment to its constitution prohibiting any law which levied a tax or made other provision for such payment from taking effect until the same had been submitted to a vote of the people and been adopted by them. This prohibition, if not a violation of the State's pledge, conflicts with its spirit. The bonds issued are legal obligations; the State is bound by every consideration of honor and good faith to pay them. Were she amenable to the tribunals of the country, as private individuals are, no court of justice would withhold its judgment against her in an action for their enforcement."

Irregularities in the Issue of Municipal Town Bonds.

In the case of the holders of bonds issued by Oswego township, Kansas, in aid of the Missouri, Kansas & Texas road, the United States Supreme Court has sustained the decision of the Circuit Court, which was to the effect that an over-issue of bonds, or a technical irregularity in their issue, would not make the bonds void when they were regular on their face and were in the hands of innocent holders. In the Oswego case $100,000 in bonds were sold, though the amount which the township was authorized to issue under the provisions of the law was only $46,000. The court held that a purchaser was not obliged to go back of the certificate embraced in the bonds and examine into all the circumstances of their issue.

Right of Consignor to Control Goods after Delivery to Company.

In Armentrout against the St. Louis, Kansas City & Northern Company, which was a suit to recover the value of certain eggs damaged by frost while on the way from Ottumwa to St. Louis, it was shown that after the eggs were delivered to the company and loaded, the agent at Ottumwa held them three days at the request of the consignor. The frost which injured the eggs happened after they should have been delivered in St. Louis, if they had been properly shipped. The company pleaded that the goods were held on the order of the consignor, and that the frost was the act of God, for which it was not responsible. The St. Louis Court of Appeals decided that the company was liable, holding as follows:

1. After delivery of goods to railway company and receipt of bill of lading thereof, the consignor loses all right to control them in any way except the legal right of *stoppage in transitu*.

2. In case of injury to goods the act of God cannot be set up as a defence by the carrier, if guilty of previous misconduct or negligence by which the exposure resulting in the loss was occasioned.

Illinois Railroad Law—Evidence as to Reasonable Rates.

In the suit against the Toledo, Wabash & Western Company in the Mason County (Ill.) Circuit Court for violation of the railroad law, the company offered to put in evidence, in defense of the reasonableness of its rates, certain testimony as to the cost of its road and the expense of operating it. The opinion of the Court sets forth the question at issue as follows:

"In the argument the defendant lays down the proposition that railroad companies in this State have the right to demand and receive a fair and just income from the capital invested in the roads, and that whatever rates are necessary to produce such an income on the investment are just, fair and reasonable rates.

"On the other hand, it is contended by the counsel for the people that this inquiry proposed by the defendant is irrelevant and immaterial, and that the defendant has not the right to fix its rates of charges on the basis of fair returns on the amount of capital invested, but that like all other commercial or business investments capital invested in railroad enterprises must submit to the inevitable laws of competition and to whatever else may affect the investment, favorably or unfavorably, and that those who invest their money in railroad enterprises have no right to demand or expect immunity or protection from the hazards of trade and commerce, which do not belong to the public generally, except so far as they may be specifically exempted or protected by specific charter provision."

The Court goes on to say that there is no precedent which exactly covers the case, and it must be decided upon its merits. It the proposed evidence must be admitted, the whole question as to the cost of the road would be thrown open and an interminable inquiry might be opened. Evidence might be required as to the cost of every item composing the property, as to what proportion of the securities fairly represented property acquired and a great number of other matters which would prolong the case indefinitely. The inquiry would be too speculative and general.

The opinion concludes as follows: "Under the law, railroad property of any kind is entitled to the same protection which the property of the private citizen enjoys. The property of a railroad corporation cannot be confiscated, nor can it be required to work for nothing, nor for a mere nominal sum simply because from favorable circumstances, its stockholders and creditors have all obtained full return with interest, for the money originally invested. The company is entitled to the full benefits arising from success in business, and under no circumstances can they ever be called upon to serve the public for less than just and fair wages. This is alike the voice of reason, justice and law. Any other rule would, in effect, be confiscation either of the property of the railroad by the people, or the property of the citizen by the railroad, as the case might be. While the law on the one hand demands obedience from all alike, the rich and poor, the strong and the weak; so on the other hand the law will, with equal zeal, protect the rights of all, allow confiscation of no man's property, either from public clamor or private cupidity or avarice.

"I am, therefore, of opinion that the objection to the fourth interrogatory of Mr. Blackstone's deposition is well taken. But in sustaining this objection I do not wish to be understood as deciding anything more than that the defendant cannot show that its charges are reasonable in that manner. I entertain no doubt but that the company defendant may show, if it can by any means admissible under the rules, that its charges for freight and passengers were not unreasonable nor unjust. That right is given to defendant by the statute. In what I have said I do not want to be understood as expressing any opinion except upon the single point covered by the decision."

Summary Remedy Against Corporations.

A law of considerable importance passed by the recent Maryland Legislature reads as follows:

"If any persons are or shall be aggrieved by any company, incorporated by the laws of this State with authority to transport or carry persons or property for hire, by reason of anything done or omitted to be done by the said company, in violation or contravention of its duty in regard to the transportation or carriage of property or persons as aforesaid, it shall and may be lawful for such persons to apply by petition in a summary way to the Circuit Court for the county, or Superior Court for the City of Baltimore, where said company shall have an office for the transaction of business, for relief against the said alleged grievance, and thereupon said court shall appoint a short day for hearing the matter of the said petition, of which the said company shall have notice, and on hearing of the parties, or in case the said company shall fail to appear and show cause against the said application, on examination of the said petition and the evidence which shall or may be produced by the petitioner in support thereof, and the said court shall and may pass such order for relieving the said petitioner or otherwise, as to justice shall appertain, and the said court shall have full power to enforce obedience to the said order by writ of injunction or attachment or other process, which would be applicable in the enforcement of the said order in the event that the same had been passed by the said court in the exercise of its general equity jurisdiction, and the said court shall have power to provide for the examination of witnesses under a commission or by deposition, and for taking or collecting other necessary evidence to be used at the hearing as aforesaid and for the trial of issues involving any controverted matter of fact by a jury, under the direction of the said court, if the said court shall deem such trial to be proper, and either party may appeal from the final order to be passed by the said court, or any order determining the merits of the said application or any part thereof, to the Court of Appeals, and the said appeal shall be heard and determined at the first term of the said court next after the transmission of the transcript of the record of the said appeal to the said court, and in the event of an appeal as aforesaid, the said Court of Appeals shall have authority to pass such order in relation to the costs of the said proceeding as may seem right and proper.

"Sec. 2. And be it enacted, That this act shall take effect from the date of its passage."

The Maryland General Railroad Law.

The late Legislature of Maryland passed a new general railroad law, a brief synopsis of which is as follows:

Section 1 repeals the previous law. Section 2 provides that any number of persons not less than five, three of whom must be citizens of Maryland, may form a corporation.

Section 3 provides that a certificate setting forth route and termini of the road, capital stock, etc., must be properly acknowledged and filed with the Secretary of State. By Section 4 such company thereupon becomes a corporate body with all necessary powers, authorized by Section 5 to build a railroad on the route set forth.

Section 6 provides that the stock shall be divided into shares of $50 each. Section 7 requires that 5 per cent. be paid on all subscriptions when made, other installments to be payable as required by directors.

Section 8 gives power to sell stock for installments unpaid more than 60 days, 30 days' notice of sale to be given. Section 9 provides for increase of capital stock by three-fourths vote of existing stock, certificates of such increase to be filed with the Secretary of State.

Section 10 provides for the opening of subscription books upon 30 days' notice in one newspaper of each county through which the road is to pass. As soon as 10 per cent. of the stock is subscribed a meeting is to be called to elect directors, not less than seven in number.

Section 11 gives authority to acquire right of way, etc., and provides rules for condemning property needed. Section 12 gives authority to change location of road after its completion, if found necessary or expedient. Section 13 authorizes companies to acquire property of any municipal corporation in substantially the same manner as of private persons.

Section 14 fixes maximum rates at 3 cents per passenger per mile; 5 cents per ton per mile for general freights, and 1½ cents per ton per mile for coal, ores or other minerals.

Section 15 gives power to issue bonds and borrow money to an amount not exceeding the capital stock.

Section 16 gives power to hold and convey necessary lands; Section 17 to change the course of any stream, with due regard to rights of others therein.

Section 18 provides that a general office must be established at some point on the line of the road. Its location may be changed on giving 30 days' public notice.

Section 19 requires signs to be placed at all road crossings.

Section 20 requires each company formed under the act to make annually, in the month of January, a full report of the condition of its affairs to the Comptroller, showing the amount of the capital stock of such company, the gross amount of tolls, or receipts during the previous year, the cost of repairs and incidental expenses, the net amount of profits, and the dividends made, with such other facts as may be necessary to a full statement of the affairs and conditions of such road, and the Comptroller shall present an abstract copy of such report to the General Assembly at each session thereof.

Section 21 requires that before a bridge over any canal or navigable water can be built a plan thereof must be filed with the Board of Public Works for approval. In case of failure to receive such approval an appeal is allowed to the Circuit Court of the county; but no bridge over a canal shall be less than 12 feet in the clear above the water line, with piers and abutments placed so that navigation and use of the tow-path shall not be obstructed.

Section 22 provides that no railroad company, heretofore or hereafter incorporated under the laws of this State, shall enter into any agreement for the consolidation of such railroad company with any other railroad company, or aid any other railroad company in the construction of its railroad, by means of subscription to the capital stock of such other railroad company, or otherwise, or shall lease or purchase all or any part of any railroad constructed by any other railroad company, without the authority of an act of Assembly authorizing it to enter into such agreement, or to give such aid, or to make such lease or purchase, being first had and obtained.

Section 23 provides that trains must make a full stop of at least one-half minute at all stations where passengers are advertised to be received, under penalty of from $20 to $100 for each violation.

Sections 24 and 25 repeal all inconsistent laws and give the act immediate effect.

THE SCRAP HEAP.

A New Coal Car.

Gen. John D. Imboden, of Richmond, Va., has designed a new pattern of coal car, one of which has been built at the Chesapeake & Ohio shops. It is thus described by the Richmond *Whig*: "It is so constructed as to permit the load to come down within six inches of the rail. The centre of gravity of the present coal cars of the Chesapeake & Ohio road, when loaded, is 6 ft. 6 in. above the rail; on the new car it will be only 3 ft. 4 in., thus securing steadiness, and reducing to a minimum the destructive forces of oscillation. The dumping gates are on the side of the car. The form of construction utilizes the maximum strength of materials. The car has what might be aptly termed a *spinal* beam that receives all the strain of pulling and bumping, and so far relieving the cross timbers and joints in this respect that a saving of nearly 50 per cent. in *dead weight* is effected. Two of these eight-ton cars weigh no more than one large gondola car. The two will carry 16 tons of coal, the gondola only 10 tons. It is estimated that a locomotive that now hauls 200 tons of coal per train will, with these new cars, haul 275 tons, a saving of 37½ per cent. The car possesses another advantage in being capable of instant conversion into a common freight car, after discharging its load of coal. The inventor calls it the 'low-gravity centre-draft car,' and with slight modifications in construction it is applicable to cotton, grain in bulk and live stock transportation."

Railroad Manufactures.

The Lake Erie Iron Company at Cleveland, O., has just completed an order for 300 steel axles for the Pennsylvania Company.

Singer, Nimick & Co.'s steel works at Pittsburgh are running to their full capacity.

The New Albany (Ind.) Steam Forge has contracted to furnish 2,500 car axles to Seath, Hager & Co., car builders, of Terre Haute.

The New Castle (Pa.) Iron Company's works are running double turn.

The Pittsburgh *Manufacturer* says that "there are 24 steel works in Pennsylvania, not counting the Bessemer works, of which there are five."

The Baldwin Locomotive Works at Philadelphia recently turned out three eight-wheel engines for the Philadelphia, Wilmington & Baltimore road. They have 16 by 24 inch cylinders and are fitted with the Westinghouse brake.

The Ohio Falls Car Works at Jeffersonville, Ind., recently completed a passenger car for the Indianapolis, Bloomington & Western.

The Wason Manufacturing Company's Works at Springfield, Mass., are running on half time.

The Hudson (N. Y.) Iron Works will stop for repairs about the middle of June. The furnace has been in blast 32 months.

There is talk of transferring the Canadian Locomotive & Machinery Works from their present location at Kingston, Ont., to Montreal.

The Philadelphia & Reading Company's car shops at Reading, Pa., are to build ten palace cars for use on the road.

Brown, Bonnell & Co.'s iron works at Youngstown, O., are running double turn.

The Union Rolling Mill at Cleveland, O., is running on merchant bar and rails.

The Pittsburgh *Manufacturer* says: "An evening paper speaks of the use of Russia sheet iron by the Baltimore & Ohio Railroad Company on their locomotives where brass was formerly used, also for all work where a polished sheet metal is needed. This notice does injustice to Messrs. W. D. Wood & Co., of this city, this firm having supplied their patent polished sheet iron for all the locomotives of the Baltimore & Ohio Railroad Company for some years. Messrs. Wood & Co. also supply all the polished sheet iron used by all the railroads leading out of Pittsburgh, including the extensive shops of the Pennsylvania road, and many of the oldest and largest railroad companies of the West, with many of the leading locomotive manufacturers of the country. The polish of this iron is not only equal to the best Russia, but there is an economy in its use, as the sheets are made to pattern and size to avoid the necessity of splicing required in the use of the imported article."

The Pennsylvania Railroad shops at Altoona, Pa., began to run eight hours a day June 1. Some men were discharged at the same time.

Osgood Bradley, at Worcester, Mass., has recently delivered three passenger cars to the New York, Providence & Boston road.

The disagreement between the manufacturers and the puddlers at Pittsburgh could not be settled by conference, and most of the mills were closed June 2. The manufacturers offered to pay $4.75 per ton on a 2½-cent card, with an increase of 10 cents per ton for each increase of one-tenth cent on the card. The men demand $5 per ton and 15 cents advance.

Messrs. Vose, Dinsmore & Co. have transferred their spring business to a new company known as the National Car Spring Company, which also secures control of the steel works of Benjamin Atha & Co., at Newark, N. J. Arrangements have been made by which the new company and the Crescent Spring Company, of Pittsburgh, will work together in all respects.

Messrs. Vose, Dinsmore & Co. will continue to carry on the railroad commission and steamship supply business as heretofore.

The Baldwin Locomotive Works at Philadelphia are now delivering 17 engines to the Delaware, Lackawanna & Western Railroad. Two of these are 18 by 24 in. cylinder passenger engines; five 20 by 24 in. cylinder consolidation engines, and 10 are Mogul pattern with 18 by 24 in. cylinders. The consolidation engines are substantially like the one built for the Lehigh Valley road, and now on exhibition at the Centennial. An order for ten-wheel engines for the Lehigh Valley road is also in progress.

The Mason Machine Company at Taunton, Mass., has just delivered a new double-truck narrow-gauge engine to the Boston, Revere Beach & Lynn road.

Porter, Bell & Co., at Pittsburgh, recently shipped a narrow-gauge engine to the Boston, Revere Beach & Lynn road.

The Grant Locomotive Works at Paterson, N. J., have sold ten of the eight-wheel connected freight engines which were built to go to Russia. They are to be altered to consolidation engines, to have new boilers, and will go to the Lehigh Valley road.

The Louisville Bridge & Iron Company has a contract for two spans of iron triangular truss bridge, 100 feet each, on the line of the Nashville, Chattanooga & St. Louis road.

The La Crosse Bridge Bids.

The Milwaukee *Sentinel* says: "The Chicago, Milwaukee & St. Paul Railway Company have received forty-eight proposals to build the superstructure for the new railway bridge across the Mississippi at La Crosse and are now examining into the merits of the several structures of the bidders. Two Milwaukee firms are among the number who have offered to do the work, as will be seen by the annexed schedule:

Delaware Bridge Company	$91,549
Phœnixville Bridge Company	108,835
Detroit Bridge & Iron Company	114,000
Leighton Bridge Company	92,714
Louisville Bridge & Iron Company	114,450
Keystone Bridge Company	112,900
Kellogg Bridge Company	104,944
M. Lassig, Chicago	90,100
American Bridge Company	92,735
Baltimore Bridge Company	110,545
L. Soulerin	137,500
Milwaukee Bridge & Iron Works	109,450

"The bridge contemplated is to be of iron, of an entire length of 1,680 feet; is to have five spans, each of 148 feet, two of 164 feet each, one of 250 feet and a draw of 360 feet."

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Editorial Announcements.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

AMERICAN IRON PRODUCTION.

The iron industry of the United States has grown so rapidly since the war that probably most people are not yet aware of its importance—of the fact that this is the second iron-producing country in the world. Unquestionably the fact that the business has grown smaller since 1873, and that it is in a sufferingcondition, is a much more prominent fact than this other, that the business is still a very large one, and has suffered less here, perhaps, than in most other countries from the stagnation of recent years and the decline in railroad construction.

The statistics collected by the American Iron and Steel Association, and published for the first time last week, show that the production of pig iron for four years has been:

	Tons produced.	No. of blast furnaces.
1872	2,854,558	612
1873	2,868,278	657
1874	2,689,413	693
1875	2,266,081	713

Thus the decrease in production since 1873, the year of greatest production, has been about 602,000 tons, or 21 per cent. Meanwhile there has been an increase of nearly 9 per cent. in the number of furnace stacks, and, counting the average number of each year as the mean between the number at its beginning and at its close (the number given is that at the close of the year named), the average production per furnace was 4,905 tons in 1872, 4,517 in 1873, 3,984 in 1874, and 3,224 tons in 1875. This decrease in average production is in spite of the fact that the newer furnaces have generally a much larger capacity than the older ones, and is due entirely to the fact that a larger and larger proportion has been out of blast since 1873. At the close of 1875, of the whole number of 713 stacks, 420, or 60 per cent., were out of blast.

From this the conclusion is easily made that business has been declining; but when we go back of 1872 we find that the production in this extremely dull year of 1875 was 10½ per cent. more than in 1871, 36 per cent. more than in 1867, and nearly 150 per cent. more than in 1865. In view of the tremendous forward progress made before 1873, the decline since is trifling.

As to the locality of the production of pig iron, in 1875 42 per cent. of the whole was made in Pennsylvania, 18.3 per cent. in Ohio, 11.8 per cent. in New York, 5 per cent. in Michigan, 2.8 per cent. in New Jersey, 2.8 in Wisconsin, 2.7 in Missouri, 2.2 in Illinois and 2.1 in Kentucky, in no other States so much as 2 per cent. In the States west of Pennsylvania and north of the Ohio (including Missouri) 32 per cent. of the pig iron was made in 1875, against 27½ per cent. in 1874 and 27 per cent. in 1873.

The production of rails during the year was positively large, being nearly 8 per cent. greater than in 1874, and amounting to 792,512 tons, or enough to lay 9,000 miles of track with 56 lbs. rails, or to renew 7,400 miles of track besides providing for the new road constructed during the year.

Of the entire rail production, 32.2 per cent. was rolled in Pennsylvania, 23.7 in Illinois, 11.6 in Ohio, 10.5 in New York, and in no other State so much as 4 per cent. The States west of Pennsylvania and north of the Ohio (including all west of the Mississippi) rolled 47.6 of the entire production—a fact which would hardly have been believed possible a few years ago. The proportion rolled in the same States in 1874 was 40½ per cent.; in 1873, 39½ per cent.; in 1872, 33½ per cent., in 1871, 29¾ per cent.

The most striking feature in the returns of the year is the great production of Bessemer steel rails. The production of iron and steel for four years has been:

	Bessemer.	Iron.	Total.	P. c. of steel.
1872	94,070	905,930	1,000,000	9.4
1873	129,015	761,062	890,077	15.6
1874	144,944	584,469	729,413	19.9
1875	290,863	501,649	792,512	36.7

Here in the face of decreased railroad construction, small railroad profits and the general disposition to put off expenditures for improvements, we find the Bessemer rail production doubled since 1874, and trebled since 1872. Last year the production was sufficient to lay 3,305 miles of track with 56 lbs. rails. There had been made in this country, down to the end of 1875 (all within nine years) 746,000 tons of Bessemer rails, besides large importations down to 1874. The manufacture, of which comparatively little can have required renewal down to this time, has been sufficient to lay 8,470 miles of track.

	1872.	1873.	1874.	1875.
Production	94 070	129,015	144,944	290,863
Importation	149,786	159,571	100,486	7,800*
Total	243,856	288,586	245,430	298,663

* Estimated.

In spite of the small importation, the consumption appears to have been larger than ever before.

Previous to 1872 the domestic production of Bessemer rails had been 91,675 tons. There were considerable importations previous to that time, the amount of which cannot be ascertained, as the reports before that year do not separate iron from steel. But omitting these as equivalent to the amount of Bessemer rails that have required renewal since their first introduction into this country, we have 1,160,410 tons now presumably in the tracks of American railroads—sufficient for 13,186 miles of track of 56 lbs. rails.

Commenting on the facts shown in the report of the rail production of 1874, in an article on page 386 of our last volume (September 18) we said that the average weight of rails per mile of *road* (not mile of *track*) in this country certainly would not be less than 100 tons, and on this basis we estimated the percentage of renewals for each of three years beginning with 1872 Continuing the calculations then made, we have the following, in which the consumption per mile of new railroad (nearly all of it single track, with few sidings, and much of it light railroad, with rails weighing 40 lbs. or less per yard) is reckoned at 85 tons per mile; and the average amount per mile of all railroads at 100 tons.

	Railroad mileage.	Tons of rails for renewals.	Tons renewed per mile.
1872	59,478	855,570	14.4
1873	66,818	796,214	11.6
1874	70,651	665,570	9.4
1875	72,638	668,560	9.3

Thus the proportion of road renewed last year is a trifle less than in 1874 even, and indicates an average life of rails of 11 years, against an average life of seven years only four years ago.

The deductions here made are not exact, but they seem to leave no escape from the conclusion that the railroad tracks in the United States are now, on the average, much more durable than they were a few years ago, and that this increased durability is due largely to the fact that now 15 per cent. of these tracks are of Bessemer steel.

From the Atlantic to the Pacific in 84 Hours.

The "race across the continent" has been run and won. It takes one's breath away to think of it. The man still lives whose "Two Years Before the Mast" were occupied chiefly in making the journey to San Francisco and back. Even young people remember, when gold was discovered and the rush for California began, how the journey was the great obstacle between the old States and the new El Dorado; how to go to California was more of an undertaking than to go to Palestine or to India; how long farewells were taken, as for a separation which must be for years and was quite possibly forever; how the emigrant leaving the Missouri as soon as the grass had started hardly reached the Sacramento before Autumn, after hardships such as only the boldest or the most ignorant dared face. And now a party of players make the journey luxuriously in just half a week! It certainly is something which will justify a little glorification, a sensation which thrills us, however much we analyse it, and the more so the more we think of it. Why, the flowers which the popular actor received as the curtain fell in New York the night before he took the train for the Pacific were still fresh in his hand as he landed at San Francisco. Our country of magnificent distances seems converted into a country neighborhood, where every man can, at need, see any other with a little pains, and where, consequently, there is a community of interests, and a kindly fellow-feeling which really makes us one people—almost one family.

As we said, in commenting on the journey when it was as yet only a project, no extraordinary speed was needed to make this journey in 84 hours, no speeds exceeding those regularly made by many English and by some American trains. The extraordinary and unexampled feature was the maintenance of that speed for so great, so enormous a distance—such a distance as a train could run in no other country, for want of a route long enough, or a country broad enough to hold the route. There are, however, some considerations which make the average speed itself remarkable under the circumstances, as it would not have been in Europe. These are: the fact that it is exceptional, that the locomotives of the country are not specially designed for high speeds with light trains, but for moderate speeds with heavier trains; and, especially, that the railroads of the country are not constructed for such headlong speed—not simply because they are (most of them) less solidly constructed and with more and sharper curves, but especially because they are wofully open to obstruction by passing men, animals and vehicles. The very best of the lines over which the Jarrett & Palmer special train passed last week not only crosses most of the highways on its line at grade, but also has level street crossings probably in every city on its road, and cannot possibly, with safety, run at full speed over miles of its line. On an English road, with hardly a level crossing from one end to the other, with easy curves and a perfect track, the engine can be pushed to its utmost and kept at its highest speed from the beginning to the end of the line. But how can you run five miles through city streets at 60 miles an hour? You might almost as well discharge a rifled cannon down the street.

There were, however, two remarkable feats in the running of this train, wholly unexampled, we believe, in the annals of railroads. The first of these was the running of the train *without stopping*, and of course with a single locomotive, the whole length of the Pennsylvania Railroad from Jersey City to Pittsburgh, 439½ miles; and the other the hauling of the train over the whole length of the Central Pacific Railroad, 881 miles, without changing the engines, though with several stops.

The cars which composed this train were a baggage car, a smoking and "commissary" car, both constructed by the Pennsylvania Railroad Company at its Altoona shops, and the Pullman hotel car "Marlborough." The locomotive which performed the great feat of running 440 miles without stopping was an "American" engine constructed at the Altoona shops, No. 573, of the Pennsylvania Railroad Company, which is used on the Pittsburgh end of this road, burning bituminous coal.

The engine (No. 573) is one of the company's standard Class "C" locomotives, with 17x24 in. cylinders, two pairs of 5-feet drivers coupled, weighing 74,300 lbs. This road is provided with track troughs, and the tender had a "jerk-water," so that no stops were needed to take water. Besides the tender load of bituminous coal, several bags of it were stowed in the baggage car. The exact consumption we have not learned. The engineman belonging to the engine, William Phillips, of the Pittsburgh Division, ran it throughout; but an engineman from each divison was on the train, and piloted Phillips over the respective divisions. We will publish a time-table showing the schedule made up for the train and the time actually made. From this it appears that the trip from Jersey City to Pittsburgh, 439½ miles, was made in 10 hours and 5 minutes, or at the average rate of 43.46 miles per hour. An examination of the full schedule shows in more than one instance a speed between stations of more than a mile a minute, reaching between Princeton Junction and Trenton the rate of 64 miles per hour. The speed, however, has been equalled on this road before, though perhaps not over its whole length. The extraordinary thing, of course, is the long run without a halt, the speed never being less, it is said, than 25 miles an hour.

From Pittsburgh to Chicago and from Chicago to Council Bluffs the run was made over roads which have a large traffic and for most of their length but a single track, so that greater skill was required to avoid delays by other trains. No such delays occurred, however, at least none were reported, and the only interruptions to the run as laid out appear to have been on the Pacific railroads, where on the Union Pacific a hot journal is said to have caused 20 minutes' delay, and on the Central Pacific steep grades, going down the Sierras, the brake blocks on

"EMBRACE OF THE LEVIATHANS."

the Pennsylvania cars wore out and had to be replaced, and finally two additional cars were attached to make their brake power available. On all the roads west of Pittsburgh, however, stops had to be made for water, and on all but the Central Pacific the usual changes of engines were made. Concerning the run on the latter, Superintendent Towne telegraphed:

"The feat is accomplished. Train arrived at 9:25—twenty-six minutes less than 84 hours from New York. Actual average running time from Ogden to Oakland 41¼ miles per hour. Hank Small, engineer, brought No. 149 through with train, cool and all right. The most wonderful performance in the annals of railroading.

"We had much trouble with defective brakes and worn brake-shoes on Pennsylvania Railroad cars, and were obliged to use our cars coupled to them from Truckee to Oakland. Twenty-three hours and fifty-two minutes from Ogden to San Francisco."

The following are the times and distances by each road, as definitely as we can ascertain them at present:

	Time.	Distance.	Av. speed per hr.
Pennsylvania:			
Jersey City to Pittsburgh	10h. 05m.	439¼	43.46
Pittsburgh, Fort Wayne & Chicago:			
Pittsburgh to Chicago	11h. 31m.	468	40.07
Chicago & Northwestern:			
Chicago to Council Bluffs	11h. 30m.	488	42.44
Union Pacific:			
Omaha to Ogden	24h. 50m.	1,033	41.60
Central Pacific:			
Ogden to Oakland	23h. 38m.	876	37.12

In this no account is made of the ferries at Jersey City (1 mile) and Oakland (2 miles) which may properly be omitted from the account of the rail journey; but there are other omissions, as the time from the arrival at Pittsburgh to the start thence, a similar delay at Chicago, between roads, as it were, and moreover the time from Council Bluffs to the Omaha depot, a distance of four miles. The reports published do not enable us to know at what moment each company received the train.

For the entire journey by rail from Jersey City to Oakland, 3,313 miles, the time consumed was 83 hours, 32 minutes, 7 seconds, and the average speed, including all stops and delays, was 39.7 miles per hour. From New York to San Francisco, 3,316 miles, including the two ferries, the time was 83 hours, 59 minutes, 16 seconds.

The delays on the Central Pacific which Mr. Towne's telegram attributes to the lack of brake power on the excursion cars were charged in some of the telegrams from the train to the condition of the Central Pacific engine.

The Rockford, Rock Island & St. Louis Litigation.

Mr. Osterberg, who represented the German bondholders in the foreclosure suit by which they got possession of the Rockford, Rock Island & St. Louis Railroad in satisfaction of their lien, sailed for Europe last Wednesday, after having completed the purchase of the road, organized a new company wholly controlled by the bondholders, and turned over the property to it; so that the work which he was commissioned to do seems to be pretty thoroughly accomplished. The bondholders have at last full possession of the property which was mortgaged to them to secure the payment of their claims, and will hereafter have the entire profits of the property, whatever these may be, and manage it as may seem most advantageous to them.

This road, though crossing one of the best agricultural countries in this country, is unwisely placed, and never could reasonably have been expected to earn interest on its funded debt. It failed very soon after it was opened, and the management which constructed it retired, and the control went into the hands of Rock Island parties of wealth who had previously managed a short coal road, but whose chief interests were in coal mines near Rock Island. It was from this management that the bondholders took the road, opposed at every step, and with a persistence which seems remarkable when we take into consideration how clear was their case and how absolute their claims. This resistance was continued after the foreclosure sale and the completion of the purchase by the German bondholders. We have heretofore noticed a suit brought against Mr. Osterberg in the name of a Miss Hooper, a bondholder who had joined the German party. In this suit Mr. Osterberg was charged with having converted a portion of the funds of the road to his own use, and the appointment of a new receiver was asked. The Court refused the petition and confirmed the sale to Mr. Osterberg. Last Tuesday Mr. Osterberg called on the father of Miss Hooper (the bonds being in her name, but the action being directed by him), when it appeared that he did not know that the suit had come to trial even, much less that it had been decided and that Mr. Osterberg's party was in possession; still less that another suit had been brought in his daughter's name. The suit, apparently, had been conducted as if the plaintiff had no interest in the result and no voice in its conduct. Mr. Osterberg affirms that this suit was really brought at the instance and expense of the old management and others who aimed to keep the property out of the hands of the proper owners, partly at least to prevent disclosures of transactions which would not bear the light. He also charges that recent abandonment of engines, without notice, by several enginemen on one of the divisions of the road was at the instigation of this same party. His statement is that Joseph Elder, the Master Mechanic, told these men that within a week the Cable management would be reinstated, and that the way to keep their places there was to abandon their engines, so as to injure the management which the Cable party was fighting; whereupon the following enginemen, John W. Gray, John A. Bailey, J. K. Fezler, A. A. Kavanaugh, S. M. Cowan, J. A. Lucas, Dan Maney, John Henderson, J. W. Weaver, Henry Devlin, John B. Gough, M. E. Combs and T. H. Rogers, abandoned their engines without complaint or notice, thus virtually joining in a conspiracy against the owners of the road, and for the time interrupting the conduct of their business.

It is quite possible, of course, that the representatives of the German bondholders may fail to make the best use of the property which has fallen into their hands; but anyone who has followed the history of this road must feel that it is the bondholders who deserve sympathy. They were cruelly deceived, in the first place, both by our and their countrymen, who exaggerated vastly the value of the property, some who made the misrepresentations being virtually bribed to do so. When default was made in the payment of their interest, every effort was made to prevent such a union among them as would enable them to enforce their lien; and when at last they had formed an organization, including, it is true, but a fraction of the whole number of bondholders, yet open for all to join on equal terms, they were opposed as bitterly as if they had no rights which anyone was bound to respect. And now that they have the road, they cannot ever hope to earn with it, however successful and skillful the management may be, anything like the interest on the money actually paid for the bonds.

This company was about the first to fail of the new railroads constructed with German money, and partly for this reason and partly because the failure was so complete, and the suffering therefrom so great, it has done more probably than any other one case to destroy American railroad credit in Germany. It seemed at one time probable that investors there would have reason, from the course of this case, to conclude that, in addition to the deceitfulness of railroad projectors and negotiators of railroad bonds, the law's delays and the uncertainties of vexatious litigation in America virtually destroyed the rights of mortgagees and made their lien of no effect. Now that they have got the property, they may conclude that a mortgage means something, even a mortgage on an American railroad. Hereafter, if they do not get satisfactory results, it must be the fault of the property or the fault of their own management.

"Embrace of Leviathans."

The plate with this title is copied from a photograph which has been sent us, but where the accident occurred we have been unable to learn. Indeed, a story has been told (those who will may believe it) that when it became known that a photograph of the scene had been taken, the managers of the road on which it occurred paid a very large sum for the negative, to prevent its publication. However that may be, at least one copy printed from it has survived. It tells its own story and is the witness to its own truthfulness. The imagination could hardly conceive of such a scene—a single combat of iron monsters, in which both fought to the bitter end, and stood unyielding even after death.

The Grain Movement.

The grain movement continues active, with less indications of subsiding than heretofore; for while the shipments until now had so far exceeded the receipts that the stocks accumulated during the winter at lake ports were about exhausted, and it seemed that the amount carried weekly must decrease for want of grain to carry, the week ending May 27 shows receipts at Northwestern markets nearly as great as the shipments and the latter but little less than heretofore; for the following week receipts at Chicago alone were nearly as great as the receipts at all Northwestern markets during previous weeks, and more than twice as great as for any other week since navigation opened. We continue our record of the shipments eastward by lake and rail as follows:

The shipments of grain of all kinds from Northwestern markets for the five weeks ending May 27, including the whole period of low rail rates and the opening of lake navigation, have been:

Week ending—	By Lake.	By Rail.	Total.	P. c. by rail.
April 20	1,634,541	2,072,946	3,707,487	56
May 6	2,445,191	2,292,633	4,737,824	48¾
" 13	1,538,526	2,302,940	3,841,466	60
" 20	1,602,170	2,016,304	3,618,474	55¾
" 27	1,747,408	1,820,456	3,567,864	51
Total	8,967,836	10,505,279	19,473,115	54

Thus during only one week of the five since the low rates prevailed have the lake shipments equalled the rail shipments, and this was the first week after the opening of the Straits, when vessels chartered and loaded long before cleared on their first trip for the lower lakes.

Below may be seen the receipts of each port of grain of all kinds for the 13 weeks from March 5 to May 27 of this year, and also the receipts for the last five weeks of that period, during which rail rates were at the present low figure, while navigation was open most of the time:

Receipts at—	March 5 to May 27.	P. c.	April 22 to May 27.	P. c.
New York	14,113,062	39.4	8,703,150	45.4
Boston	2,695,358	7.5	1,396,052	7.3
Portland	942,462	2.8	251,110	1.3
Montreal	1,424,680	4 0	1,219,615	6.4
Philadelphia	7,859,375	21.9	4,033,400	21.2
Baltimore	7,086,459	19.8	2,855,925	15.0
New Orleans	1,723,414	4.6	679,572	3.5
Total	35,845,847	100.0	19,138,824	100.0

During the six weeks before the break in rates, New York's receipts were but 33 per cent. of the total, while Baltimore got 24.6 and Philadelphia 21.7 per cent. However, the two latter places have maintained their positions wonderfully well, considering that they have not only the very low New York rail rates but the open canal to work against. They receive very large quantities of corn especially, and an advantage in rates of 2 cents to Philadelphia and 2½ to Baltimore has been maintained, together with a drawback of 1½ cents on grain exported, which has been sufficient to prevent the monopolization of the business at New York. Indeed, nearly all the grain shipped by way of the Pennsylvania Railroad must now go to Philadelphia and Baltimore, for in spite of the greatly increased business, its deliveries in New York are much smaller than during previous years at this time, as the following table of receipts at New York by the different routes during the month of May for three years will show:

Grain Receipts at New York by Different Routes during May for Three Years.

Railroads:	1876.	1875.	1874.
Pennsylvania	358,412	724,968	829,771
New Y. Cen. & H. R.	1,637,015	1,807,623	1,523,709
Erie	2,058,136	1,242,062	2,057,780
Other roads	5,855	1,745	1,828
Total by rail	4,259,418	3,776,398	4,413,088
Water:			
Hudson River boats from N. Y. Cen. at Athens	1,150,580	.....	.....
Other water receipts	4,407,239	*210,153	5,344,044
Total by water	5,558,819	210,153	5,344,044
Grand total	9,818,237	3,986,551	9,757,132

*Canal not open until May 18, too late for large receipts at New York before June.

The percentage received by each principal route in May during each of these years was:

	1876.	1875.	1874.
Pennsylvania	3.65	18.13	8.51
New York Central & Hudson River	*18.71	45.30	16.61
Erie	20.92	31.13	21.09
Water (nearly all canal)	56.60	5.25	54.75

* Also 11.72 per cent. was carried by this road from Lake Erie to Athens, thence shipped down the Hudson in boats, and so appearing in water receipts.

Here we see the receipts by the Pennsylvania Railroad, in spite of an increase by all routes amounting to about 150 per cent., have fallen off one-half. It has, however, pretty well kept up its proportion of flour receipts, delivering 21⅓ per cent. of the total this year against 26¼ by the Erie, and 9¾ per cent. by the New York Central, the latter road, however, sending down in boats from Athens 29 per cent. of the total.

Apparently the New York Central is carrying most of the grain shipped through by rail from the Northwest to New York. The large Erie shipments come chiefly from the lakes, and the Pennsylvania, as we have seen, though doubtless carrying very large quantities, is delivering very little at New York.

A New Dutch Railroad Law.

Holland has recently passed a new railroad law which will go into effect on the 15th of October next, having been bitterly opposed by the Dutch railroad companies, as it gives so great a degree of government control and holds the carriers and their employes so severely responsible that the companies pronounce it oppressive. For instance, the Minister of the Interior is to designate the points where stations and stopping places shall be established; the establishment of time-tables is subject to him; and he is to determine what shall be the minimum number of cars of each class attached to each train; and by general regulations, which the administration is to determine, all the following details will be governed: station service, watching the road, service of signals, arrangement of the entire rolling stock and inspection thereof, composition of trains, binding officers and employes by oath, speed of trains, train service, dealing with unclaimed goods, and further, "everything required in the interest of the proper exercise of the service and safety in working."

With regard to tariffs, the following rules are made: All tariffs according to existing laws require the approval of the King; hereafter the Minister of the Interior will exercise this function. Before the tariffs come into operation they must have been made public; and printed copies showing all the rates charged must be placed were they will be accessible to the public. A reduction of the rates may be ordered by the King at any time. If the net profits of the railroad are lessened in consequence of such a reduction, the loss will be made good from the Treasury of the Kingdom. But if, notwithstanding the reduction, the net profits are still more than 8 per cent. on the capital, the Treasury cannot be called upon to make good a decrease. Any favoring of individuals, associations, enterprises, or judicial persons in rates or transportation is forbidden. Neither may the carrier make any special agreement with one or several shippers to carry for them at less than the published rates, with these exceptions: the transportation of great quantities; contracts for the transportation of one or several car-loads; for benevolent purposes and fairs. The first two of these permissible reductions must be reported to the Minister of the Interior. These reductions at once become applicable to all freight similar in kind transported over the same section of road under the same circumstances, and must be published by the carriers. Through tickets and through way bills must be issued between all stations on all the lines under a single management, and freight, when practicable, must be sent through without changing cars.

The State shall have the right, twenty years after a railroad has been opened for traffic, to purchase such road, at a price to be determined as follows: 1. A sum equal to one-fifth of the sum of the net earnings of the seven previous years after the earnings of the two least productive years have been subtracted, multiplied by 20,—or, more briefly expressed, twenty times the average net earnings of the five most productive years in the seven years next preceding the year of the purchase. 2. An additional sum amounting to 15 per cent. of the above. Thus, should a railroad earn 6, 7, 8, 9, 10, 10 and 10 per cent. in each of the seven years preceding the purchase; the first part of the purchase price would be:

$$\left\{\frac{(8+9+10+10+10)}{5}\times 20\right\} = 9.4\times 20 = 188;$$

and the second part would be $188\times 0.15 = 28.2$, making the whole $188+28.2 = 216.2$ to be paid by the State for every 100 of the investment. Average net earnings for the best five of the seven years at the rate of 4.35 per cent. on the capital would make the price to be paid just par.

Among the provisions of the law is one providing that railroad managers, officers and employes who have been found

guilty of designedly endangering transportation, besides suffering specified fines and terms of imprisonment, shall be disqualified by decision of court from exercising any function thereafter in any railroad in Holland; and this judgment may be pronounced if the danger was not intended. If after such condemnation the person remains in or re-enters railroad service, he may be fined from $40 to $800 or imprisoned from one to three months. Travelers who violate the regulations made for them will be fined from 40 cents to $30, or imprisoned from one day to one month. Officers and employes are required to deny entrance to the cars to persons who have been guilty of such violations, and to remove them from the train should they succeed in entering.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Scioto Valley.—Extended from Kingston, O., south to Chillicothe, 10 miles.

THE PACIFIC RAILROAD COMPANIES, or the two chief ones, have submitted to the House Judiciary Committee a new basis of settlement of the Government claims. By this it is not proposed that the Government shall buy back any of the lands donated, but that, virtually, an extension of the time of payment shall be made. Each company offers to pay into a 6 per cent. sinking fund $600,000 a year for ten years, and $750,000 a year thereafter until the whole debt—principal of bonds and accumulated interest—shall have been retired. But this payment is to be made in lieu of the 5 per cent. of net earnings now required, concerning the interpretation of which a suit is now pending. Until this point is decided it will be impossible to say just what the yearly dues of the companies are now, or to what extent either party would profit by the proposition. The proposal made, however, to compel the companies to pay more than the present law requires in liquidation of their debt the companies have a right to complain of. There is no probability that it could be enforced, but it would compel litigation of uncertain duration (though hardly uncertain issue) and meanwhile seriously injure the credit of the companies and the legitimate value of their stock.

INTER-STATE TRANSPORTATION, the charges therefor and the discriminations therein, are to form the subject of an investigation of a sub-committee of the House Committee on Commerce, which is to take testimony and make a report. This is very well. Commercial interests often suffer by what legislative bodies do, but not from what they know; and every effort made to obtain complete and accurate information deserves encouragement. It is true that the investigation may be one-sided, and the information wofully incomplete; but the parties interested have it in their power, usually, to prevent this. They should not wait to be called upon, but volunteer contributions of facts affecting the business concerning which legislation is proposed. Let them remember that, though there are always men ready to vote as they think will gain them most popular favor, still it is always harder to pass a law which has been proved to be unjust or ineffective, and that the thing to be feared is that legislators will know too little, not too much.

THE BAXTER STEAM CANAL BOATS, which were to reduce the cost of canal transportation and drive the horse boats from the business, are not running this year, their proprietors maintaining that rates are too low to pay expenses. The lowness of rates, however, has not prevented the horse boats from carrying enormous quantities, and if the Baxter boats are so much more economical than the horse boats, the latter must be incurring debts very rapidly for the privilege of running.

THE UNITED STATES INTERNATIONAL EXHIBITION.

III.

CAR WHEELS.

The present Exhibition contains probably the best display of cast-iron car wheels and the materials from which they are made that has ever been made. Doubtless, the discussion of the qualities, wear and endurance of such wheels, which has been carried on during the past year or two, has led manufacturers to this kind of wholesome emulation. Owing to the attention which has been directed to the service which wheels do or do not perform, records have been kept, with much greater accuracy than ever before, and it is now possible to say with tolerable certainty what the service of car wheels really is. With such data we are inclined to believe that some of the "estimates" which have been made of the service performed by car wheels would require to be very materially modified. The general impression among those who have looked most closely into the subject is, that cast-iron car wheels as a rule do not form as much service as it was formerly supposed they did. There is, of course, a vast difference in the quality and endurance of different kinds of wheels, and the problem which is at present being slowly solved, is the exact endurance due to a given quality of wheels or kind of service. It is not surprising, therefore, that in this International Exhibition manufacturers should have exerted themselves to present the merits of their wheels in the most favorable light.

CAYUTA WHEEL & FOUNDRY COMPANY.

This company, whose works are located at Waverley, N. Y., exhibits a case showing ores and pig iron from which its wheels are made, and broken chill tests, showing the chill which the iron is susceptible of. The wheels exhibited are 28, 30, 33 and 36 inches diameter for ordinary roads, and a specimen of a standard 24-inch wheel for narrow-gauge roads, and also a pair of wheels for horse-cars. Those exhibited are of both the "Washburn" and single-plate pattern. The exhibition is a very creditable one, with the exception of some of the painting and gilding on the wheels. The gaudy colors give their work a sort of juvenile appearance, which we are sure is not at all characteristic of their productions. During the progress of the celebrated trial in Brooklyn, which distracted public attention for so many months last year, the *Nation* in commenting on the condition of society that made possible some of the peculiar habits and customs which were revealed at that time, described it as a sort of "chromo-civilization." The same term may be paraphrased for the present occasion and "chromo-engineering" will describe a good many things in the Exhibition. The term is especially applicable to the lavish use of paint and gold leaf to many of the exhibits which have been prepared for public view. Now the unfavorable comment we must make on the exhibit of the Cayuta Company, and we will be obliged to make it of many others, is that there is too much chromo-engineering about it.

THE LOBDELL CAR WHEEL COMPANY,

of Wilmington, Del., has a case containing specimens of pig iron from North Carolina and from Baltimore which they use in the manufacture of wheels. They also show specimens of chill tests and pieces of the run or tread of wheels, showing the depth and character of the chill. The wheels which they exhibit are of 18, 24, 26, 28, 30, and 33 inches diameter, some are of the "Washburn" pattern, some similar to that pattern but with wrought-iron spokes,* others with cast-iron spokes, and some of the single-plate pattern. They also exhibit horse-car wheels of the ordinary pattern and others with wrought-iron spokes.

The most interesting portion of their exhibit is the specimens of cast-iron chilled wheels with turned treads. There are specimens of new wheels turned and of old ones which were put into service rough and then after failing were turned up and again put into use. One wheel is shown which had been in service without turning and which developed a blotch or spot on the tread about 2¼ in. long and 1¼ in. wide and 1/6 in. deep. The tread of this wheel has been turned so as to remove about one-half of this spot. It required a cut of more than one-eighth of an inch deep to do this. Underneath the spot on the surface of the iron there is no appearance whatever of any imperfection in the metal, and from appearances, if the wheel should be put into use it would do as good service as the most sound new wheel that could be found.

A pair of truck wheels is exhibited which were put into service in the rough condition under an engine on the Camden & Atlantic Railroad, run 56,668 miles, and were then removed because they were considerably worn and had some spots on the tread. They have been turned, and will be again put into service at the close of the Exhibition. Their appearance now indicates that they are just as capable of performing service as they were when new, or possibly more so. Still another pair of engine truck wheels of 26 or 28 in. diameter is shown which were put in use rough under engine No. 61 on the Philadelphia, Wilmington & Baltimore Railroad. The engine weighs 66,250 pounds. Before being turned they ran 29,274 miles, and then some spots made their appearance, and the wheels were taken out and turned, and have run since 28,600 miles, and are still in a good condition, and at the close of the Exhibition will be put into service again without turning. Reference has heretofore been made in these columns to this pair of wheels. Another pair of 30-in. tender wheels in this exhibit have run 23,450 miles since being turned. Specimens of wheels are exhibited which have been in service 20 years, and a 4-ft. cast-iron tire which was one of a set of four tires made by the Lobdell Company and furnished to the Richmond & Danville Railroad Company and placed under their engine "Fury" in March, 1857. The tires were taken out of service in 1866, having run 15 years. Mr. Thomas Dodamead, then the Superintendent of that road, wrote: "This engine was almost exclusively employed on material and gravel trains and in switching cars from the time the tires were put on until removed, the engine scarcely ever being turned; consequently the wear and tear was greater than it would have been with ordinary regular service."

An old wheel from the Erie Railway is shown which was in use over 20 years, and an extract from the Port Jervis *Gazette* is published in which the editor of that journal calculates that it must have run over a million and a half of miles. The data on which this calculation is based are not satisfactory, and in the language of a Scotch jury our verdict would be "not proven." The calculation is made on the supposition that freight cars run on an average over 80,000 miles per year, which is at least four times more than they will average.

The Lobdell Company is now constructing a lathe for turning chilled wheels which it expects to have completed in a short time. It proposes to test the economy of turning chilled wheels thoroughly, and it now has several sets in use under cars on the Philadelphia, Wilmington & Baltimore Railroad.

There is a touch of chromo-engineering about their exhibit, a tendency to which, it seems, they could not entirely resist.

LEHIGH CAR WHEEL & AXLE WORKS.

These works, of which Messrs. McKee & Fuller are the proprietors, have a neat case of chill tests and pieces of broken wheels to show the actual chill in the wheels. They exhibit one 30 in. plate wheel, two 26 in. spoke wheels, and a 24 in. narrow-gauge car wheel and several smaller wheels. They are attached to a revolving center piece, so that they can be rolled around in a circle somewhat after the manner of the wheels of a turn table, In this way each one can be brought into full view. The arrangement is very neat, and the whole is surmounted by two pairs of nickel-plated models of wheels bearing a flag. This indicates just a little playfulness and is quite different from the abnormal ornamentation of the wheels themselves. Chromo-engineering has, however, not passed this exhibit by entirely, but has left its mark in the form of center-plates on the axles and brilliant paint on the wheels.

BALTIMORE CAR WHEEL COMPANY.

This company has one of the most tastefully arranged exhibits in this group. The wheels are placed on stands high enough to be easily and conveniently seen, and are arranged in two rows on each side of their space. The center is occupied by four large glass-covered cases, one containing specimens of the Baltimore charcoal pig iron, which is used by this company in their wheels. Another case contains chill tests taken at consecutive times from the iron used for tires and street car wheels. The two other cases contain tests taken in a similar way from the iron used for ordinary car wheels. Specimens of single-plate wheels of 20, 24, 26, 28, 30 and 33 in. diameter, are exhibited on one side, and wheels of the Washburn pattern of the same size, excepting the 20 in., are placed opposite. There are also spoke wheels of 26, 28 and 30 in. diameter, and street car wheels of various patterns. Full-sized sections of the double-plate wheels, cut out of wood, are arranged on an easel in one corner of the span, and a large drawing, showing the system of annealing the wheels at their works, is placed on an easel in the opposite corner. The wheels are nearly all painted lead color, excepting a few which are not painted at all, The whole exhibit is entirely devoid of any suspicion of chromo-engineering, unless the stands, which support the wheels, and which are painted "deeply, darkly, beautifully blue," be excepted. As they are not the objects on exhibition, perhaps they are not amenable to so much condemnation as the same brilliancy of color would be in the wheels themselves.

MESSRS. A. WHITNEY & SONS.

This firm have the largest variety of chilled wheels in the Exhibition. They have also had the good sense and good taste to avoid altogether the aid of chromo-engineering to attract attention to their productions. The wheels have been placed in the space allotted to them just as they came from the foundry, excepting that they have had the sand scraped off. There is no paint or color whatsoever, no meretricious show of any kind. The objects exhibited are those which the firm produces and sells to its customers, and not an exaggerated form of the articles.

The exhibit consists of a pyramid or rather cone of plate wheels, the smallest one on top being 8 in. diameter and the bottom resting on engine tires four or five feet in diameter. There are also wheels of the Washburn pattern, of various sizes, and spoke wheels of 20, 24 and 28 in. diameter, and horse-car wheels from 24 to 36 in. diameter made with both spokes and plates. There are specimens of broken pieces of wheels and what was apparently a self-oiling box, patented by L. B. Faught. The exhibit is, however, deficient in not having either an attendant to explain things and give information, or suitable placards or circulars for visitors. We will speak more fully of this in relation to other exhibits hereafter. The only printed information in the space occupied in the Whitney exhibit is an excellent engraving of their works, on the frame of which is inscribed the fact that the total number of wheels cast and sold by this firm up to May 1, 1876, was 893,909. Their capacity is to mould daily 280 wheels 33 in. diameter and to melt 70 tons of iron and fit 150 wheels to axles.

This firm have, it is thought, not availed themselves of all the advantages which are believed to be entirely legitimate in order to show their productions to the best advantage. Their space is the last of the group occupied by car-wheel manufacturers, and some of those next to it have their floors raised up so as to bring the objects into better view. Then, too, if the floor had been covered with some dark material, or simply painted a dark color, so as to throw out the wheels in stronger contrast, this admirable exhibit would have appeared to much better advantage. In the absence of any of these, if the floor was carefully swept, and the objects dusted daily, which they both sadly need at times, it would relieve the exhibit of the appearance of neglect which it now sometimes has. As it now is, visitors will find that it contains the fullest assortment of cast-iron wheels in the Exhibition.

RAMAPO WHEEL AND FOUNDRY COMPANY.

This company shows specimens of ores, pig iron, chill-tests and pieces of the chilled treads of wheels. It has specimens of wheels 24, 26, 28, 30, 33, 36, 39 and 42 inches in diameter. The last two sizes are the largest on exhibition, excepting one which will be described hereafter. Mr. Snow, the General Manager of these works, is an earnest advocate of the use of larger wheels for cars, especially for those which run at fast speeds. This exhibit also contains one pair of wheels on a standard car axle, a 24 in. wheel for narrow-gauge roads, and one pair of horse-car wheels. With the exception of one 33 in. wheel, which is unpainted, the others are all brilliant in either lake or vermillion, and one or two of the wheels apparently revel in all the colors of the spectrum. These, with an axle turned and polished its whole length between the wheels, lay the exhibit open to the charge of chromo-engineering.

A number of old wheels are exhibited by this company. One of these is reported by Mr. H. S. Billings, Superintendent of the Pullman cars at Jersey City, to have run 158,057 miles; another, 198,610; a third, 198,093; a fourth, 163,320, and the last, 202,166 miles.

Of two other wheels, Mr. Garey, Superintendent of Cars on the New York Central & Hudson River Railroad, says: "These wheels were run (on one axle) under postal car 702 of our fast mail line, between New York and Chicago. Our records show a service of 66,989 miles. The wheels were removed at our request, and not because worn out. You can best judge the probable mileage they would have made if continued in service."

Other wheels are exhibited which have been in service over 6½ years on the Erie Railway, and some nearly eight years.

HAMILTON STEELED-WHEEL COMPANY.

This company, too, has laid itself open to the charge of chromo-engineering by the brilliancy of the paint and gilding on its samples of wheels. These consist of Washburn and single-plate patterns and spoke wheels. There are also several cases of chill tests and specimens of iron from broken wheels.

The peculiarity of these wheels is their manufacture of cast iron with the addition of a comparatively small percentage of Bessemer steel. This process or combination of metals has been patented by Mr. W. G. Hamilton, and a full account of

* Illustrated in the *Railroad Gazette* a few weeks ago.

the manner of working it by Messrs. A. Whitney & Sons was given in these pages about four years ago. The wheels exhibited are from the foundry of the Pennsylvania Railroad at Altoona—where all wheels—about 190 per day—are made by this process—from Messrs. A. Whitney & Sons, Jackson & Woodin, of Berwick, Pa., and the Sunbury Car Wheel Company.

A wheel 59 inches diameter from A. Whitney & Sons' is exhibited, also a specimen of chill from wheel of the same diameter and street-car wheels; a number of 33 and 30-inch wheels from the Pennsylvania Railroad's Altoona foundry, of their ordinary make, and wheels made of coke and anthracite iron and steel, reported to have run 156,800 miles under Pullman cars; some of these wheels are shown broken to show the chill; also wheels of all anthracite iron and steel showing their chill.

The inventor of this process says:

"As an evidence of its value as a process, the Hamilton Steeled Wheel Company refer to the fact that over 400,000 wheels made by this process are in use. At the date of the opening of the Exposition, notwithstanding the dullness in wheel-making, some 420 wheels were made daily by licensees, and out of over 70,000 wheels in use under Pullman, passenger and freight cars, engines and tenders on the Pennsylvania Railroad, made at their works at Altoona, no wheel has caused an accident of any kind; that the best recorded mileage of any wheel under passenger service on the Pennsylvania Railroad is 178,000 miles, being a wheel made by this process.

"A mixture of 8 per cent. steel and 23 per cent. anthracite and coke irons gives, with about 75 per cent. of the wheels reported, an average mileage of 57,000 miles. The highest mileage made by this mixture of coke and anthracite iron being 156,800 miles; and when all the balance of the wheels are reported, it is fair to presume that the average mileage will be much increased.

"As an evidence of the wearing qualities of wheels made by this process, a statement is given of the results of 114 wheels, taken from under Pullman cars running on Pennsylvania Railroad during February last—wheels made at Altoona, and costing on an average under eleven dollars—giving number of each wheel, mileage and cause of removal.

"The 114 wheels made a mileage of 5,973,200 miles; of this 31 wheels having made a mileage of 1,412,952 miles, or an average of 45,579 miles, are still good for passenger service. The wheels flat from sliding ran an average mileage of 27,146.23 miles; wheels slid and worn out, an average of 54,822.25; and the 60 wheels worn out an average mileage of 65,590.79 miles.

"As to the cost of wheels, two wheels are exhibited which made 156,800 miles, put in service under Pullman car No. 275 at Jersey City July 20, 1874, taken out of service Dec. 11, 1875, ran 505 days.

Composition of metal—

Steel rail ends, 8 per cent., costing	$2 40
Close spring C. H., 10 per cent., costing	3 30
Greenwood C. H., No. 2, 10 per cent., costing	3 30
Isabella C. H., No. 2, 5 per cent., "	1 65
Longdale C. H., No. 1, 4 per cent., "	1 20
Knapp coke, No. 1, 5 per cent, "	1 25
Glendon anthracite, No. 1, 18 per cent	4 70
Altoona steeled wheels, 40 per cent	8 00
Per ton	$25 80

"The ordinary car-wheel mixture used at Altoona and giving the mileages reported above is:

10 per cent. steel, at $30	$3 00
25 per cent. anthracite iron, at $25	6 25
10 per cent. old wheels, at $20	2 00
55 per cent. charcoal irons, at $35	19 25
Per ton	$30 50

"A wheel made Feb. 4, 1876, is exhibited, with eight holes knocked out of the plate and hub by blows of a 28-lb. sledge, the brackets and rim being sound, and showing by its fracture a very tough metal, and it was made of:

Steel rail	8 per cent.
Anthracite	20 " "
Old steeled wheels	20 " "
Charcoal irons	52 " "
Cost per ton	$28.51

"As to the increase of strength given by use of this process:

"The results of 18 consecutive days' trials of the same irons made for transverse strength (as a high transverse strength in irons used for car wheels is considered of more importance than high tensile strength, as the latter may frequently be found in a brittle metal), were:

"*Mixture:*

Steel Rail, 8 per cent., strength not known.
Charcoal iron, 23 per cent., strength 15,000 per square in.
" " 10 " " " 20,000 " " "
" " 4 " " " 12,200 " " "
Anthracite, 20 " " " 14,000 lbs.
Old wheels, 35 " " " not known.

"The average breaking strain of the pieces tested for transverse strength was 23,400 lbs. The maximum breaking strain was 26,500 lbs.

"In the case of specimen tests of charcoal irons: Diameter, 1.184; strength per square inch, 20,708. Same with 15 per cent. steel, 25,345.

"Charcoal iron alone: Diameter, 1.182; strength per square inch, 21,922. With 22 per cent steel, 27,930.

"Charcoal iron alone, 25,474. Same with 22 per cent. steel, 29,064.

"The above from cupola and mixtures with steel added to irons, quantities not known, testing as high as 39,694 lbs.

"Also a specimen of Scotch iron testing to 18,786 lbs., and with 25 per cent. steel testing to 23,327 lbs.

"An exhibit is made of the effect of steel on the chill, showing anthracite iron alone, also with varying quantities of steel:

Proportion of Mixture. Anthracite Iron.	Steel.	Wrought Iron.	Tensile Strength per Square Inch.	Stretch.	Transverse Strength.	Deflection.	Depth of Chill in Inches.
100	0	0	15167	.00033	5075	.00391	1-16 to ⅛
90	10	0	16267	.00023	5775	.00270	⅛ to ¼
85	15	0	17933	.00000	6325	.00290	¼ to ⅜
80	20	0	20783	.00012	6925	.00.54	⅜ to ½

It is claimed for this process that it admits of the use of charcoal irons deficient in strength and chilling properties, and also of coke and anthracite irons in the manufacture of wheels; and that by the admixture of steel or steel and wrought irons or wrought iron to the pig metal, its strength is increased and chilling properties given to non-chilling irons.

For want of room the description of other exhibits of car wheels must be postponed.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Des Moines & Fort Dodge.—At the annual meeting in New York, June 1, the following directors were chosen: Geo. Bliss, Charles Dana, D. E. Green, John L. Ludlam, C. C. Nourse, T. C. M. Paton, W. R. Sands, G. B. Smyth, Charles E. Whitehead.

Chicago & Northwestern.—At the annual meeting in Chicago, June 1, the following directors, whose terms then expired, were re-elected for three years: Albert Keep, H. H. Porter, Chicago; A. G. Dulman, R. P. Flower, Charles R. Marvin, M. L. Sykes, Jr., New York. The board re-elected Albert Keep President; M. L. Sykes, Jr., Vice-President, Secretary and Treasurer; Samuel O. Howe, Assistant Secretary and Treasurer; J. B. Redfield, Assistant Secretary and Auditor.

The same day were held the elections of the following companies, whose stock is all or nearly all owned, and whose roads are worked by the Chicago & Northwestern, with results as stated: *Chicago & Milwaukee.*—The following directors were chosen: Albert Keep, John F. Tracy, David Dows, A. B. Baylis, A. G. Dulman, M. L. Sykes, Jr., H. H. Porter, Wm. H. Ferry, J. B. Redfield. *Elgin & State Line.*—Albert Keep, J. F. Tracy, David Dows, A. G. Dulman, M. L. Sykes, Jr., H. H. Porter, W. H. Ferry, M. Hughitt, J. B. Redfield. *State Line & Union.*—Albert Keep, J. F. Tracy, M. L. Sykes, Jr., H. H. Porter, M. M. Kirkman, E. D. Richardson, Wm. H. Ferry, J. B. Redfield, M. Hughitt. *La Crosse, Trempeleau & Prescott.*—A. Keep, J. F. Tracy, David Dows, A. G. Dulman, C. R. Marvin, M. L. Sykes, Jr., H. H. Porter, Wm. H. Ferry, M. M. Kirkman. *Winona & St. Peter.*—A. Keep, J. F. Tracy, David Dows, A. G. Dulman, A. B. Baylis, W. L. Scott, M. L. Sykes, Jr., H. H. Porter, Wm. H. Ferry.

Middletown, Unionville & Water Gap.—At the annual meeting in Middletown, N. Y., May 28, the following directors were chosen: James A. Bell, Grinnell Burt, W. H. Clark, Oscar Dunn, D. C. Dusenberry, M. S. Hayne, James B. Hulse, James N. Pronk, Asa Smith, Levi Starr, H. A. Wadsworth, H. R. Wilcox, W. H. Wood. The road is leased to the New Jersey Midland.

Grand Rapids & Indiana.—The new board has re-elected the old officers, as follows: President, W. G. Hughart; Secretary and Treasurer, W. R. Shelby; Auditor, F. A. Gorham; Superintendent Southern Division, P. S. O'Rourke; Superintendent Northern Division, J. M. Metheany; General Passenger and Ticket Agent, J. H. Page; General Freight Agent, A. B. Leet; Master Mechanic, James M. Boon; Paymaster, J. H. Hughart; Purchasing Agent, A K. Allen; Solicitor, D. Darwin Hughes.

Illinois Central.—At the annual meeting in Chicago, May 31, the three directors whose terms then expired were re-elected for four years, as follows: Wm. Tracy, W. H. Osborn, L. V. F Randolph. Messrs. Constantine Moneias and Frederick Sturges were also chosen directors to fill vacancies.

Allegheny Valley.—Mr. T. Robinson has been chosen Treasurer in place of Mr. Volz, deceased. He has been Acting Treasurer since Mr. Volz's death.

Burlington & Missouri River in Nebraska.—The office of General Ticket Agent has been separated from that of General Freight Agent, and Percival Lowell appointed to the first-named position.

Detroit, Hillsdale & Southwestern.—Mr. Charles Wheeler has been appointed General Freight and Ticket Agent, with office at Ypsilanti, Mich.

Gilman, Clinton & Springfield.—Mr. J. W. Lane has been appointed Auditor and General Ticket Agent.

Macon & Brunswick.—Dr. W. C. Jones, late General Ticket Agent, is appointed Auditor. Col. Henry M. Drane has been appointed General Ticket and Passenger Agent, with office at Macon, Ga.

Mobile & Ohio.—Mr. R. H. Briggs is appointed Master Mechanic, in place of R. McDougal, resigned.

Lake Superior & Mississippi.—Mr. Walter McFarland has been appointed Master Mechanic, and took charge June 1.

Burlington, Cedar Rapids & Minnesota.—Mr. C. G. Clark has been appointed Chief Engineer, in place of E. A. Garvey, resigned.

Central Vermont.—Mr. I. B. Futvoye, agent at St. Johns, P. Q., is appointed Division Superintendent of the Stanstead, Shefford & Chambly Railroad. He will continue his duties as agent at St. Johns.

Illinois Midland.—Mr. A. B. Powell has been appointed General Superintendent. He has been connected with the Indianapolis & St. Louis road.

Pacific Mail.—The new board has elected Mr. Wm. P. Clyde President. He is a well-known merchant and ship owner of New York.

Dakota Southern.—Mr. George E. Merchant has been appointed General Superintendent, in place of J. S. Meckling, resigned.

Wilton.—At the annual meeting in Nashua, N. H., May 31, the following directors were chosen: C. C. Boutwell, William Ramsdell, John Reed, Solomon Spaulding, J. W. White. Mr. J. Thornton Greeley was chosen Clerk. The road is leased to the Boston & Lowell and Nashua & Lowell companies.

Boston, Clinton, Fitchburg & New Bedford.—The following officers have been chosen for the consolidated company: President, Solomon H. Howe, Bolton, Mass.; Vice-President, Lyman Nichols, Boston; Manager, H. A. Blood, Fitchburg, Mass.; Superintendent, S. A. Webber, Fitchburg, Mass.; Assistant Superintendent, Warren Ladd, New Bedford, Mass.

Troy & Greenfield.—The stockholders still keep up the organization, although the company has no property but a hopelessly deferred claim against the State, and they met in Boston May 31 and elected directors as follows: Lewis Rice, Otis Clapp, Edward Appleton, F. H. Forbes, D. W. Gooch, Harvey Arnold, Asa P. Morse, F. L. Chapman, Herman Haupt. The board elected Lewis Rice President; F. L. Chapman, Clerk.

Chicago, Milwaukee & St. Paul.—At the annual meeting in Milwaukee, June 5, the following directors were chosen: Alexander Mitchell, John Plankinton, Milwaukee, Wis.; Joseph G. Thorp, Eau Claire, Wis.; Jonathan M. Bowman, Kilbourne City, Wis.; Selah Chamberlain, Cleveland, O.; Julius Wadsworth, Walter S. Gurnee, David Dows, Jeremiah Millbank, John M. Burke, Abram R. Van Nest, Peter Geddes, New York; G. W. Weld, Boston. The new directors are Messrs. Millbank, Van Nest and Weld, who succeed Messrs. Buell, Frank and Muller.

St. Louis, Alton & Terre Haute.—At the annual meeting in St. Louis, June 5, the following directors were chosen for three years: G. W. Wall, Duquoin, Ill.; A. H. H. Rountree, Hillsboro, Ill.; Carlos S. Greeley, Edwin Abend, St. Louis. Mr. Abend is a new director, replacing W. H. Underwood, deceased. The board re-elected Robert Bayard, President; G. W. Parker, Vice-President, Treasurer and General Manager; E. F. Leonard, Secretary; Henry T. Nash, Auditor; H. S. Depew, General Freight and Passenger Agent.

Concord.—The thirty-sixth annual meeting was held in Concord, May 30, and the following directors chosen: Onslow Stearns, Concord, N. H.; James W. Johnson, Enfield, N. H.; Joseph P. Pitman, Laconia, N. H.; Frederick Smyth, Samuel N. Bell, Manchester, N. H.; John E. Lyon, John A. Burnham, Boston.

Boston, Concord & Montreal.—At the annual meeting in Concord, N. H., May 29, the following directors were chosen: Alexander H. Tilton, Tilton, N. H.; Joseph P. Pitman, Laconia, N. H.; John L. Rix, Milford, N. H.; Joseph W. Lang, Meredith, N. H.; Samuel N. Bell, Manchester, N. H.; Peter Butler, John E. Lyon, Boston. The only new director is Mr. Bell, who succeeds John A. Parks, who declined re-election on account of ill health.

Concord & Claremont.—At the annual meeting in Concord, N. H., May 31, the old board was re-elected as follows: Onslow Stearns, Edward L. Goddard, David W. Johnson, Dexter Richards, Mason W. Tappan, Charles Minot, Charles P. Sanborn.

Nashua & Lowell.—At the annual meeting in Nashua, N. H., May 31, the following directors were chosen: Daniel S. Richardson, Wm. W. Bailey, Augustus Lowell, Charles W. Amory, Frank A. McKeon. An opposition ticket received 2,706 votes to 2,870 cast for the successful candidates. Edward P. Emerson was chosen clerk, and Theodore H. Wood Treasurer.

Terre Haute & Indianapolis.—The Indianapolis *Journal* says: "Walter D. Ferrill has been appointed Master Car Builder of the Vandalia road, vice Col. Sharra resigned."

Montclair & Greenwood Lake.—The new officers of this company are as follows: President, J. Wyman Jones; Vice-President, Smith Ely, Jr.; Managing Director, Remington Vernam; Secretary, W. O. McDowell; Treasurer, M. A. Myers; Superintendent and General Freight and Passenger Agent, W. E. Dorwin.

White River & Rutland.—Mr. Chester Pierce has been chosen President.

Portland, Saco & Portsmouth.—At the annual meeting in Kittery, Me., June 5, the following directors were chosen: John P. Brown, Charles E. Barrett, George E. B. Jackson, Portland, Me.; Wm. H. Y. Hackett, Portsmouth, N. H.; S. L. Thorndike, Beverley, Mass.; Samuel C. Lawrence, Medford, Mass.; Nathaniel Hooper, Boston. The road is leased to the Eastern Company.

Rensselaer & Saratoga.—At the annual meeting in Waterford, N. Y., June 5, the following directors were chosen: George H. Cramer, Charles Cramer, Joseph M. Warren, George B. Warren, E. T. Gale, Wm. A. Shepard, Thomas White, Wm. H. Vanderbilt, Isaac V. Baker, James Forsyth, Wm. H. Hart, Joseph W. Fuller, Thomas Dickson. The road is leased to the Delaware & Hudson Canal Company.

Saratoga & Schenectady.—At the annual meeting in Waterford, N. Y., June 5, the following directors were chosen: Geo. H. Cramer, Charles Cramer, Stephen E. Warren, Joseph M. Warren, E. T. Gale, A. D. F. Gale, James M. Manin, Henry C. Lockwood, Geo. M. Tibbits. The road is leased to the Rensselaer & Saratoga and sub-leased to the Delaware & Hudson Canal Company.

Atlantic, Mississippi & Ohio.—In the suit brought by consolidated bondholders the United States Circuit Court has appointed Charles L. Perkins, of New York, and Henry Fink, now Superintendent of the road, Receivers.

Maryland State Directors.—The Maryland State Board of Public Works has elected the following State directors for the various companies in which the State has an interest:

Worcester.—John T. Hammond, L. R. Purnell.
Dorchester & Delaware.—James A. Stewart, Edward Goslin.
Worcester & Somerset.—John P. Hargis.
Annapolis & Elkridge.—A. Gassaway, W. E. Berry, H. H. Aisquith.
Queen Anne's & Kent.—Dr. W. Finley, Wm. McKenny, J. R. Emory.
Kent County.—Wm. S. Walker, S. A. Merritt, R. C. Johnson.
Maryland & Delaware.—Samuel Hambleton, Edward Lloyd, W. C. Satterfield.
Wicomico & Pocomoke.—H. Humphreys, L. L. Derickson, Wm. Showell.
Eastern Shore.—W. S. Parsons, W. H. Roach, W. H. Gail.
Philadelphia & Baltimore Central.—John Kaveny.
Baltimore & Ohio.—O. Horsey, I. M. Parr, J. L. McClure.

Chesapeake & Ohio Canal.—At the annual meeting in Annapolis, Md., June 5, A. P. Gorman was re-elected President, with the following directors: M. Bannon, D. B. Crawford, D. S. Biser, J. G. Berrett, Patrick Hammill, Henry Farnandis.

Hudson Suspension Bridge & New England Railway.—At the annual meeting in New York, June 5, the following were elected directors for the ensuing year: Charles J. Pusey, Edward W. Serrell, John Q. Hoyt, L. T. Guthrie, N. P. Stanton, A. W. Humphreys, Edward R. Wiswell, Job A. Jackson, N. N. Halsted, Alden I. Swan, Alfred R. Griggs, James R. Macbeth, Alfred A. Marsh.

New York Central & Hudson River.—At the annual meeting in Albany, N. Y., June 7, the following directors were chosen: Cornelius Vanderbilt, William H. Vanderbilt, Cornelius Vanderbilt, Jr., William K. Vanderbilt, Augustus Schell, Samuel F. Barger, Joseph Harker, Chauncey M. Depew, John E. Burrill, Walter S. Church, Chester W. Chapin, George J. Whitney, James M. Marvin. The only change from last year is the substitution of Cornelius Vanderbilt, Jr., for Henry R. Pierson.

Terre Haute, Worthington & Bloomfield.—The first board of directors is as follows: Solomon Claypool, George C. Day, Robert N. Hudson, Wm. A. Ketcham, L. P. Chapin, Robert S. Cox, Fred. A. Ross.

PERSONAL.

—Mr. E. A. Garvey, for a long time Chief Engineer of the Burlington, Cedar Rapids & Minnesota road, has resigned that position.

—Mr. Frank K. Hain resigned his position as Superintendent of Motive Power of the Erie Railway, June 1.

THE SCRAP HEAP.

Old Railroad Employes.

The Renovo (Pa.) *Record* says: "We think that 15,024 miles is a pretty long walk for an old man to make within three years. Mr. John Kepler, Sr., of Shintown, track walker on the Philadelphia & Erie Railroad, accomplished the task on the 15th ult. He is 61 years old, hale and hearty, and still walks 16 miles per day six days in every week. During his three years' service for the railroad company, he has not missed a single day's duty."

An exchange says: "There is an engineer running now daily, except Sunday, from Chambersburg to Martinsburg and return, on the Cumberland Valley Railroad. He commenced in March, 1839, as a fireman, and after the expiration of two years was appointed an engineer, which latter position he has occupied ever since, a period of 35 years, altogether fireman and engineer 37 years, giving entire satisfaction to the company. He is in the 66th year of his age and his name is James Adams."

Stealing Locomotives.

On June 2, as a train on the New York Central & Hudson River road was passing the prison at Sing Sing, N. Y., four convicts, who had managed to escape from the prison, jumped upon the engine, uncoupled it from the train, and presented a revolver at the engineman's head, forcing him to start the engine at high speed. A dispatch was sent to the next station ordering a switch to be turned to throw the engine from the track, but it did not reach that point, for after running some two miles, the convicts stopped the engine and took to the

woods. A similar occurrence took place about a year ago, when the plot was partly defeated by the engineman's courage and presence of mind.

A dispatch from Hearne, Tex., to the Galveston *News*, dated May 20, says: "A strange occurrence took place here to-night. The north-bound freight train on the International road, after finishing work in the yard, pulled up above a crossing at the Junction House, and the train men were all at supper, when some unknown party took the engine and four cars and left. The engine was followed by the engineer afoot, who found the engine 2¼ miles north, steam shut off, with 90 lbs. pressure. No one knows for what this was done, but the supposition is that it was to injure the company."

OLD AND NEW ROADS.

Western Union Telegraph.

The directors have submitted a statement for the quarter ending June 30, June being estimated. A summary of it is as follows:

Net earnings for the quarter	$735,488 57
Dividend on International Ocean Telegraph stock	125,000 00
Surplus, April 1	102,402 82
Total	$962,891 39
Interest on bonds	$116,576 90
Sinking fund	20,000 00
Purchase Southern & Atlantic stock	200,000 00
Construction of new lines	32,900 60 369,477 50
Surplus	$593,413 89

Out of which a dividend of 1¼ per cent. for the quarter is declared.

Terre Haute, Worthington & Bloomfield.

A company by this name has filed articles of incorporation in Indiana, and purposes building a railroad from Terre Haute southeast to Bloomfield, about 40 miles.

Auction Sales of Railroad Securities.

In New York, June 7, New Orleans, Mobile & Chattanooga first-mortgage bonds brought 36; Toledo, Wabash & Western equipment bonds, 6⅛; Louisville, New Albany & Chicago stock, 5⅛; Memphis & Charleston stock, 5; Burlington, Cedar Rapids & Minnesota first-mortgage Muscatine Division bonds, 13.

Atlantic, Mississippi & Ohio.

General Mahone has written a letter to defend himself from the attacks recently made upon him and from the imputation of bad faith in his dealings with the bondholders. He sets forth that he was bound to recognize the rights of the divisional bondholders and that he has always protected them so far as lay in his power. He charges Mr. Collinson with bad faith in the publication of private letters, and in some other matters.

A meeting of the holders of divisional bonds was held in Baltimore, May 30, a large number being present. After some discussion resolutions were adopted to the effect that the appointment of a receiver would be detrimental to all concerned. A petition against the receivership was prepared and generally signed.

The application for the appointment of a receiver came up before the United States Circuit Court June 2, pursuant to adjournment. The company put in a demurrer to the bill of complainants on the ground that they represented too small an interest to give them a standing, and also for want of equity. After argument the Court allowed the company to withdraw the demurrer and gave it to the following day to put in an answer to the complaint.

After hearing argument for several days the Court announced its intention of granting the motion for a receiver, and gave the parties another day to see if they could not agree upon some one who would be acceptable to all the interests concerned.

June 6, the Court made an order appointing as receivers Charles L. Perkins, of New York, and Henry Fink, now Superintendent of Transportation of the road. It is understood that these parties were mutually agreed on, Mr. Perkins representing the bondholders' interests and Mr. Fink those of the company.

Pacific, of Missouri.

A St. Louis dispatch, dated June 6, says: "In the United States Circuit Court to-day a decree of foreclosure of the third mortgage bonds of the Missouri Pacific Railroad was consented to, subject, however, to the rights of St. Louis County to its claim for $700,000, and the right to a prior lien over all other incumbrances. It is understood that C. K. Garrison, who represents the holders of these third mortgage bonds, has made a proposition to the County Court of St. Louis County, that the holders of these bonds consent to a foreclosure of the mortgage and the sale of the road, and will make over to the county $700,000 of the new third mortgage bonds to secure its claim."

Joliet & Northern Indiana.

In the suit brought by the bondholders the United States Circuit Court in Chicago has entered a final decree providing that the company should transfer the lease of the road to the Michigan Central to Mr. Wadsworth, trustee under the mortgage, or to Receiver Eames; that it should surrender to the Receiver 38 Chicago, Burlington & Quincy bonds now in its possession; that the Receiver sell these bonds and pay over the proceeds to the bondholders; that he shall also collect the rent accruing under the lease and report to the Court from time to time. It is also ordered that the Michigan Central pay the $89,000 due as rent for 1875, and pay the rent in regular semi-annual installments hereafter. The Michigan Central is also enjoined from paying any rental except to the Receiver, and from taking any steps to break the lease. Either party may appeal on giving proper bonds, to be $350,000 if the Michigan Central appeals, $100,000 if the other company appeals, or $350 if a joint appeal is made.

Boston & Lowell.

This company invites proposals for $750,000 new 6 per cent. currency bonds, having 20 years to run from July 1. This issue was authorized by the stockholders at the annual meeting last January, and is for the purpose of funding the floating debt. Proposals may be sent to C. E. A. Bartlett, Treasurer, at his office in Boston until June 15.

Emlenton & Edenburg.

The contract for the grading and bridging of the seven miles from Emlenton, Pa., to Turkey Run has been let to Mr. Downing, of Pittsburgh, who began work June 5, and is to complete it by Aug. 1.

Valley, of Virginia.

A special meeting of the stockholders was held in Staunton, Va., May 30, to hear the report of the directors on the matter of leasing the road. There was a pretty sharp debate, some of the Valley stockholders accusing President Pendleton and Mr. Keyser of defeating the proposed lease to the Shenandoah Valley Company in the interest of the Baltimore & Ohio. Mr. Keyser explained that the board had been authorized to make a lease only for two years, while the proposition received was for 15 years. The Shenandoah Valley Company had also refused to state what security it offered. The board had done all that it could do when it referred the matter back to the stockholders. After a long discussion the board was authorized to lease the 26 miles of finished road from Harrisonburg to Staunton for a term not more than 15 years at $20,000 a year and half the net earnings, the rental to be increased *pro rata* as additional sections of the road may be completed. The board was also authorized to make a temporary lease at $2,000 per month, and instructed to require that any company leasing the road should pledge its equipment as security. Another resolution was adopted requiring the board to secure a settlement of accounts with the Baltimore & Ohio. The Baltimore city stock was voted with the Valley stockholders for the resolutions.

Jersey City & Albany.

The running of trains on this road, suspended during the winter, has been resumed. The road is 12 miles long, from the New Jersey Midland at Ridgefield Park, N. J., north to Tappantown, N. Y. It is said that work will soon be resumed on the extension from Tappantown to Haverstraw, which is nearly all graded.

Watchung.

Negotiations are pending for the operation of this road by the Montclair & Greenwood Lake Company. The road, which is a branch of the Montclair, extends from Woodside, N. J., west about four miles to West Orange. The track was laid some three years ago, but trains have never been run upon it, and considerable work will be required to make it fit for use.

Milwaukee, Lake Shore & Western.

Work was begun May 31 on the extension from Appleton, Wis., west by north to New London, which has been so long talked of and advocated. The distance is about 18 miles.

New York Elevated.

The Court of Common Pleas has decided to continue in force the injunction obtained by a property owner against the construction of a second track through the lower part of Greenwich street.

Another injunction is asked for from the Superior Court, to restrain the company from using locomotives or working the road in any way except by wire ropes and stationary engines as provided in the original charter.

Intercolonial.

The first through train left Moncton, N. B., June 2 at 9 a. m., and arrived at St. Flavie, P. Q., on the evening of June 3, on its way to Riviere du Loup. General Superintendent Brydges and a number of officers of the road were on board. A correspondent of the St. John *Telegraph* telegraphs as follows:

"The road was found to be in a much better condition than was anticipated, and throughout the journey very little difficulty was experienced in the route. The rate through Metapedia Valley was about five miles an hour; the ballasting for a considerable distance is not completed, rendering it necessary to proceed with caution.

"The scenery from Newcastle to Lake Metapedia is unrivalled in Canada; the Metapedia Valley especially is wild and romantic, equalling if not surpassing the far-famed and much admired scenery of the highlands of Scotland.

"The road will be opened for traffic in a week, and the formal opening will not take place before the 26th inst. On some portions of the route the train went at the rate of 30 to 35 miles per hour."

Mobile & Ohio.

A plan of reorganization has been prepared by joint committees of the bondholders and the board of directors, and may be summed up as follows:

1. Stockholders to surrender their certificates and to receive new ones for one-half of the former amount. The other half to be held by trustees for the purpose of voting only.

2. The present securities of the Mobile & Onio Railroad Company to be surrendered to a trust company, and held in escrow, so as to preserve to the owners all their present rights and powers, and new securities given therefor as follows:

3. Currency 6 per cent. bonds at the rate of $15,000 per mile on the 472 miles of main line, $7,080,000 in all, to be divided between holders of first-mortgage and Tennessee substitution bonds, *pro rata*, in proportion to the mileage covered by their respective liens. Coupons unpaid and up to Jan. 1, 1878, to be included in the amount to be redeemed with these bonds.

4. First-preferred 7 per cent. income bonds, interest noncumulative, to be issued for the balance of the first-mortgage and Tennessee substitution bonds.

5. Second-preferred 7 per cent. income bonds, interest noncumulative, to be issed for the second-mortgage bonds and coupons unpaid and up to March 1, 1878.

6. Third-preferred 7 per cent. income bonds, interest noncumulative, to be issued for the convertible bonds and coupons unpaid and up to March 1, 1878, also in settlement of judgments, floating debt and other claims now outstanding.

7. Dividends on stock to be paid only when an equal amount is in hand and applied to the purchase and cancellation of the preferred income bonds, in the order of their respective priorities.

The present stock is $5,320,600; the total amount of funded debt is $15,079,043.

Extensions of Mail Service.

Mail service has been ordered over the Connecticut Central and Springfield & New London roads, between Hartford, Conn., and Springfield, Mass., beginning June 1.

Meetings.

The following companies will hold their annual meetings at the times and places given:

Michigan Central, at the office in Detroit, Mich., June 26, at 9 a. m.

Ulster & Delaware, at the office in Rondout, N. Y., June 14.

National.

A bill has been presented in Congress to charter a company by this name, with a capital stock of $10,000,000, and authority to construct and operate a railroad between the cities of Washington and New York, with branches from Annapolis to Baltimore, and from Greensboro, Md., to Lewes, Del., together with two lines from Bridgton, N. J., to the city of New York, one by way of Camden, Bordentown and Jamesburg to the Hudson River, and the other by way of Vineland and Long Branch to the Hudson. The Chesapeake and Delaware bays are to be crossed by ferries. The bill provides that the United States Government shall subscribe for at least one-half of the amount of stock taken by private parties.

The proposed line includes the New Jersey Southern and and several other existing lines in Maryland and Delaware. The incorporators named are: W. B. Leonard, Addison H. Lafflin, James N. Smith, Ward B. Burnett, Gideon L. Walker, W. W. Walker, Henry Vincent, New York; J. R. McPherson, C. N. Jordan, W. S. Sneden, New Jersey; H. Kemble, Pennsylvania; John H. Rice, Maine; L. L. Lyons, Harbeson Heckman, G. W. Cummins, Delaware; G. W. Goldsborough, Henry Gantz, W. H. Tuck, Wm. H. Bains, O. D. Spaids, Maryland; A. B. Appleton, Samuel Fowler, Washington.

Missouri Railroad Taxation.

The State Board of Equalization has fixed the valuations of a number of roads as follows: St. Louis, Kansas City & Northern, road-bed $11,233 per mile; Hannibal & St. Joseph, $11,500 per mile; St. Louis, Iron Mountain & Southern, main line, $11,000 per mile; Belmont Branch, $9,000 per mile; Cairo and Potosi branches, $5,000 per mile; Missouri, Kansas & Texas, main line, $10,000 per mile; Osage Division, $5,000 per mile; Atlantic & Pacific, $7,000 per mile; Louisiana & Missouri River, $7,000 per mile; Chicago & Southwestern, $7,500 per mile; Kansas City, St. Joseph & Council Bluffs, $10,000 per mile; Pacific, of Missouri, $12,350 per mile. Equipment generally is assessed as follows: Locomotives, $6,500 each; passenger cars, $3,000; baggage cars, $1,000; combination cars, $400; open and stock cars, $350; flat and coal cars, $250; caboose, $500; handcars, $40; pay-car, $300; postal-car, $1,200; directors' car, $5,000; Pullman car, $9,500. The only exception made is in favor of the Missouri, Kansas & Texas, whose passenger cars are rated at $2,500.

A dispatch from St. Joseph, Mo., dated June 2, says: "The case of the State against the Hannibal & St. Joseph Company for $5,300 back taxes, was decided in the Circuit Court of this county to-day in favor of the company. This was the amount assessed in 1872 by the Special Board of Equalization over the returns made by the company under its charter and the point involved was whether the board had a right to go behind the return and in the capacity of a special assessor increase the valuation. The Court ruled against such right, and upon a demurrer to the evidence on the part of the State decided in favor of the company.

Texas & Pacific.

It is understood that parties interested in this road have taken a large amount of its securities, variously stated at $1,500,000 and $2,000,000, for the purpose of enabling the company to complete the main line to Fort Worth and the Transcontinental Division to Texarkana. It is reported that the company has been making some large purchases of iron in Philadelphia.

Toledo, Peoria & Warsaw.

In our record of train accidents for April, the following appeared:

"Near noon on the 7th, on the Toledo, Peoria & Warsaw track, near Peoria, Ill., there was a butting collision between a Toledo, Peoria & Warsaw and an Illinois Midland freight train. The Midland engine mounted upon top of the other and both were badly damaged. The Toledo, Peoria & Warsaw train had received orders to run to the first siding and meet the other train, but failed to reach it in time."

We are assured upon the best authority that the fault in the case was exactly the reverse of that stated. The Toledo, Peoria & Warsaw train had reached the siding five minutes before the Illinois Midland train was due, but that train came up at great speed, ahead of time. The Illinois Midland men have been taken off the other line in consequence and the Illinois Midland road had to pay the entire damages.

Boston & New York Air Line.

The new through route between Boston and New York, of which this road forms a part, is to be opened about June 10. It is made up of the New York & New England from Boston to Willimantic, 86 miles; Boston & New York Air Line, Willimantic to New Haven, 54 miles; New York, New Haven & Hartford, New Haven to New York, 74 miles, being thus 214 miles long, 20 miles shorter than the Springfield route and 16 less than the Shore Line. It has, however, 140 miles of single track, while the Springfield route is all double track, and a great part of the Shore Line also.

Staten Island & New Jersey Bridge Railroad.

A bill has been introduced in Congress to authorize this company to build a bridge over the Kill von Kull from Constable's Hook, N. J., to New Brighton on Staten Island. This project has been coming up periodically, generally in the spring of each year, for fully 25 years past, but has never assumed any practical shape.

Erie.

The new "Erie & Lehigh Valley Line" from Buffalo to Philadelphia was formally opened June 6, on which day an excursion train left Buffalo with a large number of invited guests. The run was made successfully and was a very pleasant trip, it is said.

Dividends.

Dividends have been declared by the following companies:

Boston, Revere Beach & Lynn, 2 per cent., quarterly, payable June 15.

Northern (New Hampshire), 2½ per cent., semi-annual, payable June 1.

Rock Island & Mercer County.

The contract for this road has been let to Reynolds, Saulspaugh & Co., of Rock Island, Ill., and work was begun June 1. The road is to extend the Coal Valley Railroad southward to the coal fields on Edwards River in Mercer County, Ill.

Middletown, Unionville & Water Gap.

At the annual meeting in Middletown, N. Y., May 29, President Burt reported that all difficulties arising under the lease to the New Jersey Midland has been adjusted and a settlement of accounts arranged with the Receivers, which was now before the Chancellor of New Jersey for approval.

During the year the floating debt of $8,000 has been paid; about $20,000 had been paid on account of past-due coupons, and $8,760 more was ready for payment to the second-mortgage bondholders on June 1. The coupons accruing during the year have all been paid. The rental is now punctually paid.

Atlantic & Great Western.

Youngstown (O.) papers report that a connection is being made between the terminus of the Mahoning Division, at Sharon, and the Sharon Railroad, which is also worked by this company, and which extends from Sharon northward to the main line near Transfer. When this work is done, trains will be run from Youngstown to Transfer or Shenango, connecting with east-bound trains on the main line there, instead of at Leavittsburg, as at present. For east-bound traffic from Youngstown this will be a much more direct line than the Leavittsburg route.

St. Louis, Iron Mountain & Southern.

Several routes have been surveyed for the extension which is to connect this road with the Union depot in St. Louis. Application has been made to the County Court for the necessary permission to build the road.

Nashua & Lowell.

At the annual meeting in Nashua, N. H., May 31, a resolution offered to increase the number of directors from five to seven was made the occasion of a heated debate, in the course of which it was charged that under the contract with the Boston & Lowell Company, this company was defrauded of $50,000 annually. The old board was finally re-elected by a small majority, receiving 2,870 votes to 2,706 for the opposition ticket. The defeated party charge that there is fraud in the management and that the election was not fairly conducted, and threaten to take the matter into the courts.

Colorado Central.

The Denver (Col.) *Mirror* says: "By a clever *coup de main* the Colorado stockholders (the proxies of Eastern holders, by reason of certain informalities, having been thrown out) voted themselves into positions of authority, organized a new board of management, appointed officers of their own, and by the use of a little physicial persuasion, obtained complete possession (nine points of the law) of the road and its rolling stock, and are now operating it. The Union Pacific sold and transferred the property to the Kansas Pacific, with a guarantee to carry out in good faith the terms of sale. The latter have made no effort to recover, waiting probably for the original owners to

settle the difficulty and restore the purchase. The latter will probably enter upon formal proceedings, prove up their claims, get judgment and foreclosure on the road (leaving the county stockholders out in the cold, or paying them the 20 per cent. on their subscriptions they offered to do in the first place), then get legal possession and turn over the entire property to the Kansas Pacific Company."

The local stockholders have all along opposed the consolidation with the Kansas Pacific, but were unable to prevent it, as the Union Pacific Company held the controlling interest in the stock.

Little Rock, Mississippi River & Texas.

A new line is being surveyed for the southeastern end of the Pine Bluff line of this company. The object is to find a route which will not be liable to be periodically destroyed by freshets, as the present one is.

Maryland & Delaware.

The Maryland Circuit Court has granted a decree of foreclosure and sale of this road on application of the bondholders. The road extends from the Delaware Railroad at Clayton, Del., southwest to Easton, 44 miles. It is one of the roads that were to form part of the consolidated through line of the New Jersey Southern to Baltimore and Norfolk.

Cincinnati & Martinsville.

A report is current that the Pittsburgh, Cincinnati & St. Louis Company will buy this road at the approaching foreclosure sale, and will connect it with the Cambridge City Branch of the Jeffersonville, Madison & Indianapolis by building about seven miles of road, from Shelbyville to Boggstown. There does not appear to be any particular reason for such a purchase, except that it might be used as a connection with the Indianapolis & Vincennes road.

Keokuk & Des Moines.

The new line between Buena Vista, Ia., and Sand Prarie being in full use, the old track between those points has been taken up. The new line is about the same length as the old, but has much better grades.

Kansas Pacific.

Las Animas County, Col., has voted to issue $200,000 bonds in aid of the extension of the Arkansas Valley Branch from La Junta to Trinidad.

Pacific, of Missouri.

The United States Circuit Court has made the following order:

Ordered that the receivers of the Pacific Railroad are authorized, if in their judgment they think it advisable, to purchase and retire such portion of the second-mortgage bonds on the Pacific Railroad as are required to be retired by the terms of said mortgage; provided no certificates of indebtedness be issued for such purpose without further order of this Court.

St. Louis, Keokuk & Northwestern.

Regular trains have begun to run through from Keokuk to the new terminus at Louisiana, Mo. Through cars are run between Keokuk and St. Louis, taking the Chicago & Alton from Louisiana.

Portland & Ogdensburg.

It is said that the company has completed an arrangement with Hogan & Co., contractors for the completion of the Vermont Division, by which work will shortly be resumed.

Pacific Mail.

The new board has already begun negotiations for a settlement of all differences with the Panama Railroad Company. It is understood that the two companies will work harmoniously together hereafter.

The board has also undertaken a complete reorganization of the office force, agencies, etc. The old books have been ordered to be closed up and an entirely new set of books was opened June 1, the intention being to keep the transactions of the management as distinct as possible from those of the old.

New Bedford.

The stockholders of this company at a late special meeting voted to authorize the execution of a mortgage for $1,067,000, to secure $517,000 bonds now outstanding, and $550,000 new bonds to be issued hereafter.

Under the consolidation agreement with the Boston, Clinton & Fitchburg Company, all stockholders who desire to surrender their stock must give notice to the trustees by June 30. Payment for stock assigned will be made Aug. 1, with interest at the rate of 8 per cent. per annum from May 1.

Lafayette, Muncie & Bloomington.

Col. Howe, Special Commissioner appointed by the Court to examine into the question of the Indianapolis, Cincinnati & Lafayette crossing near Lafayette, Ind., recommends a compromise, the Lafayette, Muncie & Bloomington to abandon the objectionable crossing and build a line into Lafayette east of the other road. The Indianapolis, Cincinnati & Lafayette to move its track a few feet and sell enough of its right of way to allow the laying of a parallel track; also to permit the use of its track by the other company until the new track can be built.

Toledo, Wabash & Western.

The special meeting of stockholders was held in Toledo, O., May 31, pursuant to call. The attendance was very small, not much over one-fourth of the stock being represented mainly by proxy. Resolutions were passed complaining that sufficient notice of the default in interest was not given to the stockholders before it occurred. Another resolution was adopted appointing a committee, with Mr. O. D. Ashley, of New York, as chairman, with authority to employ counsel and to contest the foreclosure sale of the road, which is appointed for June 10.

The meeting has been extensively advertised and efforts made to secure a general attendance. The small representation of the stock and the failure of stockholders generally to respond to the call of the Ashley committee in New York for funds may be fairly taken to indicate that the stockholders are not disposed to make any sacrifices to protect their interest in the property. The present value of the stock is very small, and the hope of receiving any return upon it so remote that they can hardly be blamed for refusing to pay out any money to preserve it.

In the Indiana Circuit Court at Logansport, June 2, application was made to have the decree of foreclosure and sale of this road set aside. After hearing arguments the Court decided that it had no jurisdiction in the matter. The case will probably be taken to the Supreme Court.

Central, of Minnesota.

It is stated that this road has been leased to the Southern Minnesota, the arrangement taking effect June 1. The Central road is 36 miles long, from the Southern Minnesota at Wells northwest to Mankato.

Nevada County.

This recently completed narrow gauge road, which extends from the Central Pacific at Colfax, Cal., through Grass Valley to Nevada City is now fully opened for traffic. It has been in operation to Grass Valley for some time and has done a very good business. There is some heavy rock-cutting, tunnel work and filling, some high trestles and two long bridges, one over Bear River 95 feet high and one over Greenhorn Canon, 87 feet high. The grades are heavy, there being several stretches of 116⅔ feet to the mile. The great ascent to be overcome made a circuitous route necessary, the distance from Colfax to Nevada in a straight line being but 12 miles against 22 by the road. The contract price was $250,000 in cash and $250,000 in bonds. The cash was raised from stock subscriptions and a further issue of $70,000 bonds was made for right of way, making the whole capital account $570,000, or $25,909 per mile. The road serves a well peopled mining and lumber district.

Denison & Mineola.

At a meeting held in Benham, Tex., May 25, five corporators from each of the counties on the line of the road were selected. The project has many advocates, and some subscriptions have been already promised.

Parker & Karns City.

Contracts for grading and trestling on the extension of this road from Karns City, Pa., to Millerstown, have been awarded to J. M. Davidson, and to Weiss, Britton & Co., of Statedale, Pa.

Indianapolis, Bloomington & Western.

The question of the removal of the foreclosure suits from the State to the United States Court has been postponed for a month.

The Receiver has leased 10 more engines from the United States Rolling Stock Company, to meet the requirements of the business of the road.

Mattoon & Grayville.

It is said that work is to be resumed on this road very soon.

Brazil, Bainbridge & Indianapolis.

Brazil township, in Clay County, Ind., has voted a tax in aid of this road. Van Buren township voted against the tax.

New Orleans Pacific.

The matter of holding the election on the question of the tax to be raised in New Orleans for the benefit of this road is still in the courts, and likely to remain so for some time. Meantime the directors have resolved that all tax-payers of New Orleans who subscribe to the stock now, or have already subscribed, shall, in case this tax is levied, be entitled to have the amount of such tax paid by them credited upon their subscriptions in payment or part payment of any installments called in hereafter. The company announces that it intends to go on with the work in spite of the delay and uncertainty as to this city aid.

New York & Oswego Midland.

The sale of the Western Extension under foreclosure of mortgage took place at Ithaca, N. Y., May 31, and the property was sold to O. F. Peet, of New York, for $25,000. It is said that the purchase was made for account of the bondholders, or of part of them. It is stated that about one-fourth of the bondholders have refused to sign any agreement for reorganization, or to pay the assessment required to meet the expenses of the foreclosure.

Rock River Valley.

A company by this name has been organized to build the 38 miles of road needed to extend the Rockford, Rock Island & St. Louis from Sterling, Ill., to a connection with the Chicago & Pacific at Byron.

Danville, Olney & Ohio River.

A company known as the Southern Illinois Construction Company has been organized to build this road. The capital stock is $80,000, and the office is at Olney, Ill.

The Illinois Railroad Law.

In the suit against the Toledo, Wabash & Western Company for violation of this law, in the Macon County Circuit Court, the jury, after being locked up four days, finally failed to agree and were discharged.

Kalamazoo, Lowell & Northern Michigan.

This company intends making an issue of $150,000 first-mortgage bonds for the purpose of completing its road. It is said that arrangements have been made to dispose of nearly the whole issue along the line of the road.

Cincinnati Southern.

Contracts have now been let for the 74 miles of road from Emory Gap, Tenn., southward to Chattanooga. The work is divided as follows: R. G. Huston & Co., 39 miles; J. L. Offutt, 2 miles; Shanahan, Dandridge & O'Connor, 6 miles; Boyle, Roach, Condon & Co., 8 miles; Moran & Kirwin, 5 miles; McNamara & McMahan, 3 miles; C. A. Cox & Co., 4 miles; M. McCarthy, 3 miles; W. A. Gantz & Co., 4 miles. None of the work is very heavy. Work is to be begun at once.

The entire road-bed from Shelby City to Somerset, Ky., is completed except the bridge over Hanging Fork.

Northern Pacific.

A line has been surveyed for an extension of the Pacific Division from the present terminus at New Tacoma, Wash. Ter., to Central Tacoma. The distance is about one mile. The depot grounds and yard at the new terminus have been laid out.

Erie Southern.

The contract for building this road from Erie, Pa., to Cambridge has been let to Hill, McKechny & Walker, who are now going over the line and making arrangements to begin work. The balance of $50,000 needed to make up the stock has been nearly all subscribed. Much of the right of way has been given, or payment accepted in stock.

Lockport & Buffalo.

A meeting was held in Lockport, N. Y., last week to consider the question of building a new railroad connection. The plan proposed is to build a line from Lockport to Tonawanda, about 17 miles, connecting at the latter place with the Niagara Falls Branch of the Erie. Some few years ago a similar plan was proposed and the town voted $100,000 in aid of it. It is said that this subsidy is still available.

Wilmington & Reading.

In the United States Circuit Court in Philadelphia, June 5, the following decision was given on the points in dispute in the foreclosure suit of Randolph and others against this company:

1. Notwithstanding the Wilmington & Reading Railroad Company is an inter-State railroad, the Circuit Court has jurisdiction throughout the entire line, both in the States of Delaware and Pennsylvania.

2. That, under the charter as granted by the State of Delaware, the company had no power to mortgage the corporate franchises; consequently the mortgage given and described in the bill filed is a lien upon the corporate franchises and all the property in Pennsylvania, but not in the State of Delaware.

3. The branch road extending from Birdsboro to Reading, nine miles in length, is not covered by the said mortgage.

New Orleans & Texas.

It is thought that the decision given in the suit between Charles Morgan and the New Orleans, Mobile & Texas Company will permit arrangements to be made for the completion of the line from New Orleans to the Sabine River, to connect with the Texas & New Orleans road. From the terminus of the Louisiana & Texas road at Brashear, La., to the Sabine is 175 miles, of which 30 miles are graded and the rest of the work is very light. It appears most probable that the road will be built on this line, as the bondholders who own the line from New Orleans to Donaldsonville and the unfinished sections beyond that point do not seem disposed to advance money for its completion. On the other hand it may be urged that Mr. Morgan, who owns the Louisiana & Texas road, is quite satisfied with the facilities afforded by his steamer lines from Brashear to the Texas ports and may not be disposed to extend his road unless it should become necessary for him to do so to prevent the building of a rival line. The matter is still in doubt and may remain so for a time. The Texas & New Orleans line, from Houston to the Sabine, will be finished in a few months, but will not be a valuable property until the New Orleans connection is completed.

Carolina Central.

A general reduction of 10 per cent. in all salaries and wages paid by the company has been ordered.

Scioto Valley.

The track is laid to Chillicothe, O., 10 miles beyond Kingston, the last point noted, and 50 miles southward from Columbus. The first train went through to Chillicothe June 1, and regular trains are now running.

It is said that the company will soon begin to build a branch from Circleville to reach some coal mines.

Concord.

At the annual meeting, May 30, the action of the board in leasing the Nashua, Acton & Boston road was approved and confirmed by a nearly unanimous vote.

New York, Boston & Montreal.

The New York & Boston Division was sold under foreclosure of first mortgage in White Plains, N. Y., June 5. The whole amount of the bonds and accrued interest is $3,230,835, for which amount the property was bought in by the Farmer's Loan & Trust Company, Trustee, for account of the bondholders. This division extends from High Bridge to Brewster's about 50 miles, on some 25 miles of which track has been laid, while most of the grading is done.

Portland, Saco & Portsmouth.

At the annual meeting in Kittery, Me., June 5, the stockholders voted to authorize the execution of a mortgage for $500,000 on the road and the issue of bonds to that amount.

Illinois Midland.

This road, it will be remembered, is a consolidation of the Paris & Decatur, Paris & Terre Haute and Peoria, Atlanta & Decatur. Some time since Mr. Dole was appointed Receiver, on application of the bondholders. Recently some of the creditors began suit against the company and, alleging that the consolidation was illegal, had another suit in the nature of a *quo warranto* begun to set it aside. Under this suit Mr. A. B. Powell, of Paris, Ill., was appointed Receiver of the former Paris & Decatur road. Thereupon Receiver Dole appointed Receiver Powell his General Superintendent of the whole line. Mr. Powell accepted, but resigned very soon afterwards. Argument in the *quo warranto* suit was to be heard this week.

Laurens.

In the United States District Court in Charleston, S. C., June 1, the Court confirmed the report of the referee in bankruptcy and ordered the payment of all claims approved and certified by the report. The old bondholders will receive their pay in the new bonds issued by the purchasers at 80 cents on the dollar. They may, however, elect to be paid money, and the referee is ordered to sell bonds enough at 80 to pay those who desire money, and also to pay all claims on bonds or coupons which are a fractional part of $100.

Narragansett Pier.

The grading of this road is now completed and tracklaying was begun lost week at the junction with the New York, Providence & Boston road, near Kingston, R. I.

California Pacific.

Work is progressing on the Tehama Branch and the track is expected to reach Williams', which will be the nearest station to the town of Colusa, and is 38 miles north from the main line at Woodland, early in June. Trains will be put on as soon as Williams' is reached.

Visalia Branch.

The operations of this short line, which connects Visalia, Cal., with the Southern Pacific, have been very successful and there is talk now of an extension.

Dunkirk, Allegheny Valley & Pittsburgh.

The general offices of this company were removed June 1 from Fredonia to Dunkirk, N. Y.

Denver & Rio Grande.

Work is now in progress on a branch leaving the main line at Cucharas, Col., 50 miles south of Pueblo, and running thence southwest through the Veta Pass to Fort Garland, then westward to Del Norte. It is intended to serve the new mining districts of Southern Colorado.

Louisville, Cincinnati & Lexington.

The Receiver's account for May is as follows:

Cash balance May 1		$292,403 42
Receipts from all sources		123,006 24
Total		$415,409 66
Audited vouchers and pay-rolls	$101,047 87	
Back pay vouchers	5,109 97	
Freight drafts	6,247 75	
		112,405 59
Balance May 31		$303,004 07

The receipts exceeded the payments by $10,600.65. The operations of the road for April were as follows:

Earnings from freight	$42,360 86
Passengers	31,501 38
Other sources	6,417 32
Total earnings	$80,279 56
Working expenses (78.78 per cent.)	63,248 81
Net earnings	$17,030 75
Construction and improvement	$1,395 83
Rentals	3,302 06
Deficit, Louisville Transfer and Cincinnati Bridge	1,884 86
State tax	1,190 00
L., C. & L. R. R. Co., expenses	643 84
	8,416 59
Net balance	$8,614 16

The revenue train-mileage for the month was 51,478 miles.

Wisconsin Valley.

This company is now building 75 box cars and has leased 50 flat cars from the United States Rolling Stock Company.

Intercolonial.

From an interesting description of the works at Moncton, N. B., the headquarters of the line, given by the St. John *Telegraph*, we learn that from 450 to 500 men are constantly employed in the shops there. The works include a machine and blacksmith shop of brick, 400 by 98 feet in size and well supplied with all necessary tools, including axle and wheel lathes, wheel press, steam hammers, etc.; two car shops, one of brick, 276 by 76 feet, and one of wood, 300 by 45 feet, also well supplied with tools; a paint shop of wood, 170 by 40 feet; a storehouse of brick, 100 by 40 feet, and a round-house having 17 stalls. The latter is to be enlarged to 25 stalls soon. In the storehouse is a novel machine for testing the value of

lubricating oils. Two stationary engines supply motive power, and all the equipment of the shops is of the best kind. There is a large steam pump, for use in case of fire.

Besides ordinary repairs the machine shops are now altering a number of engines from 5 ft. 6 in. to 4 ft. 8½ in. gauge, several of which are for new branch lines now building. The car shops are building seven first and two second-class passenger cars, an officers' car, two baggage and four postal cars, twelve freight caboose cars and six refrigerator cars to carry fish from the Miramichi and North Shore fisheries to market.

There has been recently completed a new building, 110 by 30 feet, adjoining the station building, which is intended for a refreshment saloon and is divided into a dining-room, kitchen and necessary offices on the first floor, with living rooms for the manager and attendants on the second floor. Moncton is the point of junction between the old line between Halifax and St. John and the new line which extends to the Grand Trunk at Riviere du Loup, connecting the upper with the maritime provinces.

The Eastern and the Canadian Express companies announce that their joint tender for the privilege of doing the express business over the lines of this road having been accepted, they have formed on organization known as the Intercolonial Express Company, which is now prepared to run daily lines and transact all the usual business of an express company.

ANNUAL REPORTS.

Nashua & Lowell.

This company own a line from Nashua, N. H., to Lowell, Mass., 14.5 miles, all double track; it leases the Stony Brook Railroad, from Chelmsford, Mass., to Ayer Junction, 15.5 miles; the Wilton Railroad, from Nashua to Wilton, 13 miles, and the Peterborough Railroad, from Wilton to Greenfield, 10.5 miles, making 53.5 miles in all. It is worked under a contract with the Boston & Lowell Company, by which the two, with their branches, are worked as one line, the Boston & Lowell taking 69, and the Nashua & Lowell 31 per cent. of the earnings.

The capital account was as follows, at the close of the fiscal year, March 31:

Capital stock ($55,172 per mile)	$800,000 00
Gold bonds ($13,793 per mile)	200,000 00
Notes payable ($18,441 per mile)	267,400 00
Unclaimed dividends	193 00
Contingent fund, balance of earnings	80,848 70
Total ($92,996 per mile)	$1,348,441 70

The earnings for the year were as follows:

From freight (49.2 per cent. of total)	$248,238 81
From passengers (48.0 per cent.)	242,104 93
From express and mails (2.8 per cent.)	13,915 89
Total earnings ($9,425.41 per mile worked)	$504,259 63
Working expenses, taxes and insurance (78.34 per cent.)	395,056 49
Net earnings ($2,041.18 per mile)	$109,203 14
Rent account	$78,312 77
Interest, funded debt	12,407 07
Interest, floating debt	5,800 90
Peterborough stage line	969 00
Adjustment with Wilton Railroad	7,675 00
	105,164 74
Net balance, carried to contingent account	$4,038 40

For the previous year there was a net loss of $32,580.53, or including old joint account and balances paid Central Vermont Company, of $79,245.97. Both passenger and freight traffic have been decreased by general depression of business.

The differences between this company and the Wilton Company have been settled by arbitration, by which $7,675 was awarded the Wilton, being one-half the sum which it would have been entitled to, had the usual dividends been paid.

Attention is called to the approaching expiration of the contract with the Boston & Lowell Company. A temporary agreement with that company was made in January, 1857, and a permanent contract for 20 years was concluded Oct. 1, 1858. Under the operations of that contract the Nashua & Lowell has paid dividends amounting in all to 158¼ per cent., an average of 8.8 per cent. yearly, besides the 20 per cent. dividend made in 1867 from the reserve fund. The question of renewing the contract will come before the stockholders before long. The board believe that in view of the changed conditions of the property some modifications will be necessary, if it is decided to renew it.

Philadelphia & Erie.

This company owns a line from Sunbury, Pa., north to Muncy and thence west by north to Erie, 288 miles. There are 34 miles of sidings owned by the company and 15 miles of private sidings. The road is operated by the Pennsylvania Railroad Company under lease.

The equipment in use on the road consists of 154 engines, 77 passenger train cars, 3,387 freight train cars and 347 service cars.

At the close of the fiscal year, Dec. 31, 1875, the capital account was as follows:

Common stock	$6,048,700 00
Preferred stock	2,400,000 00
Total stock ($29,336 per mile)	$8,448,700 00
Funded debt ($61,389 per mile)	17,680,000 00
Pennsylvania Railroad Co.	234,244 11
Interest accounts	28,385 78
Allegheny Valley R. R. Co.	17,300 00
Total	$26,408,629 89

The annual interest charge on the funded debt is $1,100,800, or $3,822 per mile. The report says: "The funded debt was increased during the past year by the issue of 1,428 bonds, $1,000 each, consolidated mortgage loan; the purposes for which said bonds were issued being as follows:

In settlement of construction account for first six months of 1874 and previous years	$71,000
In settlement of floating debt (1874)	1,329,000
In settlement of construction account (1875)	28,000
Total	$1,428,000

"On the 12th of February, 1875, a communication was received from the President of the Pennsylvania Railway, inclosing an account against the Philadelphia & Erie Railway for interest due and charged upon the books of the Pennsylvania Railroad Company, for the use of equipment, machinery, &c., for the years 1870, 1871, 1872, 1873 and 1874. Total amount, with interest, $1,337,938.57.

"At the first meeting of the board of directors, subsequent to its reception, a committee was appointed to confer with the lessee, with the view of settlement. After numerous interviews and conferences with a committee appointed by the board of the Pennsylvania Railway, the matter was settled by the Pennsylvania Railway accepting the Allegheny Valley Railroad income bonds (not indorsed), held at that time by this company, for amount of claim, at their *par value*, as a full discharge of the account.

"It having been considered essential to the future welfare of the company to fund the floating debt, this matter was also taken up by the committee, resulting in a full settlement; the lessee accepting the Allegheny Valley Railroad income bonds (not indorsed) at 80 per centum of their face value, for the sum of $315,200, the balance being paid in the bonds (consolidated mortgage loan) of this company, at 80 per centum of their face value, making the total settlement of the floating debt $1,378,189.77, or total settlement of equipment, machinery, &c., and floating debt, $2,716,128.34."

The work done, as reported by the lessee, was as follows:

	1875.	1874.	Inc. or Dec.	P.c.
Passengers carried	612,402	680,163	Dec.. 67,761	10.0
Passenger mileage	15,117,810	17,148,330	Dec.. 2,030,520	11.8
Tons freight moved	2,396,434	2,243,170	Inc.. 153,264	6.8
Tonnage mileage	311,919,109	294,466,833	Inc.. 17,452,276	5.9

Of the tonnage mileage 43.91 per cent. was of through and 56.09 per cent. of local freight.

The average result was as follows:

	Receipt.	Cost.	Net receipt.
Per ton per mile	0.865 cent.	0.571 cent.	0.294 cent.
Per passenger per mile	3.037 "	2.951 "	0.086 "

The earnings for the year were as follows:

	1875.	1874.	Inc. or Dec.	P.c
Freight	$2,698,559 83	$2,772,813 25	Dec.. $74,253 42	2.7
Passengers	459,176 61	527,910 68	Dec.. 68,734 07	13.0
Express and mails	70,784 84	79,743 56	Dec.. 8,958 72	11.2
Miscellaneous	137,375 96	126,451 79	Inc.. 10,924 17	8.6
Total	$3,365,897 24	$3,506,919 28	Dec.. $141,022 04	4.0
Expenses	2,228,483 68	2,438,133 01	Dec.. 209,649 33	8.6
Net earnings	$1,137,413 56	$1,068,786 27	Inc.. $68,627 29	6.4
Interest on equipm't, etc.	182,797 29	.....	.....	....
Net balance	954,616 27	.....	.....	....
Gross earn. per mile	$11,687	$12,177	Dec.. $490	4.0
Net " " "	3,949	3,711	Inc.. 238	6.4
Per cent. of ex's.	66.21	69.30	Dec.. 3 09	4.5

There was a considerable decrease in freight train mileage as compared with the tonnage, showing increased train loads. The average tonnage mileage per freight engine mile was in 1875, 167.7; 1874, 151.0; increase, 16.7, or 11 per cent.

The track and equipment have been fully maintained and improved. Two bridges were destroyed by fire and rebuilt, and others were repaired. There were used in repairs of track 4,173 tons steel rails, 2,099 tons iron rails and 117,546 new ties.

St. Louis, Kansas City & Northern.

This company works the following lines:

	Miles.
St. Louis to Hannibal & St. Joe Junction, near Kansas City	265.50
Moberly, Mo., to Iowa line near Coatesville	87.50
Total owned	353.00
Hannibal & St. Joe., Junction to Kansas City	9.00
St. Louis & Cedar Rapids, Coatesville to Ottumwa	43.25
Booneville & Boone County, Centralia to Columbia	22.00
St. Joseph & St. Louis, North Lexington to St. Joseph	76.25
Total worked	503.50

A line 11.50 miles long is now being built from Ferguson to the Union Depot in St. Louis. The company owns all the stock of the St. Louis & Cedar Rapids road.

The capital account was as follows at the close of the fiscal year, Dec. 31, 1875:

Common stock	$12,000,000
Preferred stock	12,000,000
Total stock ($67,989 per mile owned)	$24,000,000
Real estate and railway mortgage bonds	993,000
North Missouri first mortgage	6,000,000
Total bonds ($19,810 per mile)	$6,993,000
Floating debt ($4,778 per mile)	$1,686,772
Total ($92,577 per mile)	$32,679,772

The company now holds $2,000,000 real estate and railway bonds with the sale of which it is expected that the floating debt will be retired.

The earnings and expenses for the year were as follows:

	1875.	1874.	Inc. or Dec.	P.c.
Gross earnings	$2,643,833	$2,405,651	Inc .. $238,182	9.9
Rent of tracks	14,000	.....	.....	...
Total	$2,657,833	$2,405,651	Inc .. $252,182	10.5
Working expenses	2,110,553	1,744,623	Inc .. 365,930	21.0
Net earnings	$547,280	$661,028	Dec.. $113,748	17.2
Gross earnings per mile	5,279	4,899	Inc .. 380	7.7
Net " "	1,087	1,346	Dec.. 259	19.2
Per cent. of expenses	79.41	72.52	Inc .. 6.89	9.5

The cost of 4,500 tons of steel rails and other extraordinary expenditures are included in working expenses, though they were really improvements of the road.

The income account was as follows:

Net earnings		$547,280
Interest on bonds	$507,281	
Other interest and discount	63,633	
Taxes for 1875, estimated	62,500	
Rentals	97,878	
St. Charles Bridge, tolls to Oct. 1	101,028	
Miscellaneous accounts	13,056	
Foreign car account, balance	39,639	
		885,015
Deficit for the year		$337,735
Balance from previous year		233,666
Total		$571,401

The President's report says: "The increased facilities for freight purposes, mentioned in our last report, were further improved during the year by large additions, until the present arrangements are quite satisfactory to all receivers and shippers of freight. The adjustment of the leases of branch lines was closely considered and finally arranged on a basis that cannot but prove profitable to this company in the future. A lease was made of the Boone County & Boonville Railroad for a period of 28 years, at the rate of $7,000 per year and taxes; it is our opinion that the business on this road, now that it is controlled by this company, can be largely improved. An adjustment of the lease of the Cedar Rapids Branch was made by its owners transferring to this company all their stock, and entering into a perpetual lease of their road to us for an annual rental of $22,500. Upon this basis the earnings of this branch for the past year will pay a good net profit to this company, in addition to which we collect $14,000 per annum as rental for part of the branch. The last report of this company stated the terms upon which it was proposed to enter into a lease of the St. Joseph Branch; this lease was not ratified by that company, some slight amendments being desired. But a lease has since been confirmed by both companies without any change in time of payment or amount of rental from that originally proposed.

"An adjustment of our difficulties with the stockholders of the St. Charles Bridge Company has been made by our settling all their past and future demands, to April 1, 1877, in the preferred stock of this company; they agree to accept for the two following years five per cent. per annum on their stock, instead of 7 per cent.

"The Kitchen suit was decided by his Honor Judge Jones in favor of this company. His decision was strong, and so thoroughly exhaustive that it left no ground whatever for the suit to rest upon; and said decision was unanimously affirmed by the general term, consisting of the five judges of the Circuit Court. So that we can now say that the company is relieved from all the threatening and burdensome cases that have so long overshadowed it like a nightmare, and which have done so much to retard its progress and interfere with the development of its business.

"In your last report, your attention was called to the fact that it was imperative that immediate steps should be taken to make a connection with the Union Depot, and as soon as trains commenced running across the bridge the necessity of the connection became daily more evident. Financial arrangements were concluded in October, with Messrs. Drexel, Morgan & Co., for a loan of $700,000, on two years' time, with the real estate and railway bonds of the company as collateral. The work on the connection was advertised and contracts let by a committee appointed by the board, and is now being actively prosecuted.

"On account of the heavy mileage paid other roads, and the uncertainty of getting cars when required, it was determined, last March, to purchase 500 additional box cars. The President, Mr. Hoge, contracted with Messrs. Barney, Smith & Co., of Dayton, Ohio, for this number, which has been delivered at a cost of $276,000.

"The cost of cars, new rails and other permanent improvements and damage by freshets, in addition to the expenditures for constructing the connection to the bridge, have largely increased the floating debt; but after this connection is completed, and the $2,000,000 bonds are placed, it would so nearly extinguish the debt that it would not exceed the amount ordinarily carried in the usual accounts of the road for supplies; and from the large benefits to be derived from the connection with the bridge, the improved condition of the road, the certainty of improved receipts from local business and favorable connections with other lines, the earnings must be largely increased.

"It is due to the stockholders to say that while the last year's operations, from the causes enumerated, show extraordinary expenses, we are now running the road on a basis of earnings and expenses that will soon exhibit most satisfactory results."

Georgia.

This company owns and works the following lines:

	Miles.
Augusta, Ga., westward to Atlanta	171
Athens Branch, Union Point to Athens	39
Washington Branch, Barnett to Washington	18
Total	228

It also works under lease the Macon & Augusta road, from Camak to Macon, 78 miles, three miles of which, from Camak to Warrenton, it owns. The earnings of this line are stated separately.

The equipment consists of 49 engines, of which 46 are in running order and 3 are being rebuilt; 28 passenger, 11 baggage, 3 mail and 3 express cars; 537 box, 34 stock, 127 platform, 65 coal and 22 caboose cars; 23 shanty, 2 wood and 1 pay car.

The property was represented by the following securities at the close of the fiscal year, March 31:

Stock ($18,182 per mile)	$4,200,000 00
Bonds ($2,357 per mile)	544,500 00
Bank notes and change bills	77,673 43
Total ($20,875 per mile)	$4,822,173 43

The amount of bonds outstanding has been reduced $20,000 during the year. The company owns railroad and steamship stocks inventoried at $595,000; bonds at $117,760; has $195,869 invested in the Macon & Augusta, and $98,418 in the Port Royal road, and owns one-half interest in the Western Railroad of Alabama, which is charged on the books at $356,129. The income received from these investments during the year was $84,700.15.

A partial statement of work done is as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Engine mileage	1,083,446	1,140,269	Dec. 56,823	5.0
Bales cotton carried	206,255	219,533	Dec. 13,278	6.0
Bushels grain "	1,336,897	1,851,733	Dec. 484,836	26.2
Barrels flour "	126,548	146,292	Dec. 19,744	13.5
Tons fertilizers "	28,547	.....	....	....

The earnings for the year ending with March were as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Passage	$245,119 53	$272,487 76	Dec.	$27,368 23	10.0
Freight	920,911 60	983,864 52	Dec.	62,952 92	6.4
Mails	28,292 94	25,554 96	Inc.	2,737 98	10.7
Total earn'ng.	$1,194,324 07	$1,281,907 24	Dec.	$87,583 17	6.8
Conducting transporta'n	163,014 08	230,455 94	Dec.	67,441 86	29.3
Motive power	228,714 18	283,991 28	Dec.	55,277 10	19.5
Maintenance of way	197,018 32	243,094 98	Dec.	46,076 66	19.0
Maintenance of cars	52,931 35	68,555 70	Dec.	15,624 35	22.8
Total expen's.	$641,677 93	$826,097 90	Dec.	$184,419 97	22.3
Net earnings	$552,646 14	$455 809 34	Inc..	$96,836 80	21.2
Gross earnings per mile	$5,238	$5,622	Dec.	$384	6.8
Net earnings per mile	2,424	1,999	Inc.	425	21.2
Per ct. of exp'ns.	53.73	64.44	Dec.	10.71	16.6

The decrease in earnings was more than covered by the decrease in expenses. This result was secured by great care and economy and by a decrease of 12½ per cent. in the wages of all employes. It was also assisted by the expenditure in the previous year of $105,000 for new cars and engines, which left the equipment in unusually good order. The road-bed and track have been maintained in good condition. During the year 2,134 tons of new rails have been laid, 904 old rails repaired and relaid and 97,411 new ties put in the track. The little flange iron remaining on the Athens Branch has been taken up and replaced by T rails taken from the main line. There have been purchased 500 tons of steel rails for use during the current year.

The equipment is in good order, but a new passenger engine is needed to replace one which exploded its boiler. Two engines have been changed to coal burners, with good results.

New wood and water stations have been built at Dearing and Oconee, and another at Buckhead is nearly finished. New depots have been built at Camak and Clarkston. Alcovy Bridge has been repaired and re-covered. A temporary bridge was put up to replace the burned bridge over the Oconee, and two spans of iron bridge have been contracted for there.

The President in his report does not anticipate any immediate improvement in business. He deprecates the too great competition on through freight, and the formation of new through lines and combinations, and would prefer a local business yielding moderate but steady profits to a through business with uncertain rates, often too low to pay the cost of doing it.

The earnings of the leased Macon & Augusta road were as follows:

	1875-76.	1874-75.	Inc. or Dec.	P.c.
Passengers	$29,661 35	$34,317 89	Dec.. $4,656 54	15.5
Freight	74,479 29	77,182 86	Dec.. 2,703 57	3.5
Mails	3,950 04	3,950 04	.....	....
Total earnings	$108,090 68	$115,450 79	Dec.. $7,360 11	6.4
Expenses	94,254 35	103,364 00	Dec.. 9,109 65	8.8
Net earnings	$13,836 33	$12,086 79	Inc.. $1,749 54	14.5
Gross earnings per mile	$1,386	$1,480	Dec.. $94	6.4
Net earn. per mile	177	155	Inc.. 22	14.5
Per ct. of expenses	87.20	89.53	Dec.. 2.33	2.6

The road-bed and track have been maintained in good condition.